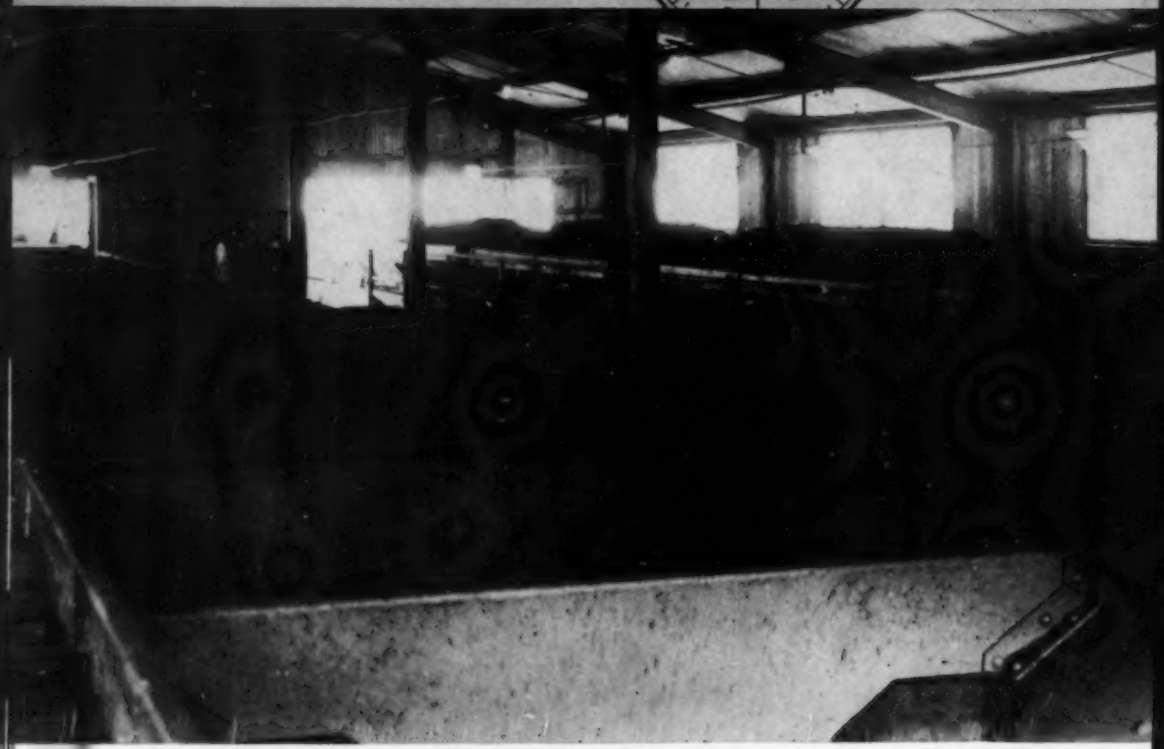
Coal Age

WHAT ABOUT CONTROLS?... p 70

Anthracite Conveyors ● Kerosene Flotation
New Short-Circuit Protection ● Drying Fines
Plastic Sealing ● Two-Shift Strip Loading
Converting Track Loaders ● Valley Stripping

From Full to Empty in "90" Seconds...



with DROP-BOTTOM MINE CARS

Imagine the extra tonnage you could produce if your mine cars could squeeze in just one extra round trip every working day.

Here is an example of how some mines *are* getting those extra loads of coal. Two minutes ago, the empty trip of A.C.F. Drop Bottom Mine Cars, at left of the photo, was carrying 80 tons of coal. Any other type of mine car would be minutes longer... unloading. But A.C.F. Drop Bottom Mine Cars dump so fast, they're back at the loaders, ready for more coal, LONG MINUTES SOONER.

It's all done automatically. As each trip of A.C.F. Drop Bottom Mine Cars passes over the unloading point, each one unloads itself, then closes and latches its own doors. There's nothing for the operator to do except keep the trip moving. That's where the 'extra' trip comes from!

A.C.F. MINE CARS

for Constant Haulage

Next time you're planning to buy new haulage equipment, find out how much 'bonus tonnage' A.C.F. Drop Bottom Cars can give. Your nearby A.C.F. Representative has the facts. American Car and Foundry Company, New York • Chicago • St. Louis Cleveland • Philadelphia • Washington • Huntington, W. Va. San Francisco • Pittsburgh • Berwick, Pa.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Photo courtesy The Philadelphia and Reading Coal and Iron Co.

Cord belt unharmed by acid water doubles record of previous belts

B. F. Goodrich Beltroad solves a coal-handling problem

THIS conveyor belt carries run-of-mine anthracite coal from a car dump up an incline to the top of the breaker. It's the fourth belt used since the conveyor was built in 1930. Each of the three previous belts lasted only four years. Acid mine water seeped into the carcass, weakening the fabric. The B. F. Goodrich man recommended the B. F. Goodrich cord conveyor belt. It's the belt shown here, in its 9th year of service, looks good for many more. Here's why:

Resists moisture, acid—Each lengthwise cord in a B. F. Goodrich cord belt is completely surrounded by rubber. A cut in belt cover admits acid to only those cords exposed; there are no cross cords through which acid could spread from cord to cord or ply to ply, as in fabric belts.

Resists impacts—With parallel cords in live rubber, under impact the rubber distorts temporarily; distributes and absorbs shocks that would damage stiff, unyielding plies. This impact cushion resists cuts, gouges. A *Transcord Breaker* floated above and across the cord section helps cushion impact, keeps cover from stretching beyond elastic limits. Provides better adhesion (at least 50% better) between cover and carcass.

Troughs better—Belt is more flexible lengthwise and crosswise; makes better contact with pulleys. Nine-ply or ten-ply belts in narrow widths trough perfectly; permit longer centers, higher lifts.

Whatever the size of the coal you move by belt, a B. F. Goodrich belt designed for coal-handling can do the job better, for less. Call in your local BFG distributor, or write us direct: *The B. F. Goodrich Company, Industrial and General Products Division, Akron, O.*

Beltroads BY
B.F.Goodrich
RUBBER FOR INDUSTRY

The Champion

In this corner: from Lake ATHAPAPUSKOW

Biggest Lake Trout ever hooked—to date

Ladeez and gentlemen—In this corner, from Lake Athapapuskow, Manitoba, wearing silver scales, measuring 47½" and weighing 63 pounds, is the biggest fresh water lake trout ever caught by rod and reel—that is, as of August 22, 1930—the Champion and, to our knowledge, still unbeaten! Caught by a lady, too! So, all you trout fishermen, hats off to this record fish and the mighty clever "fisherman" who landed it.

Data from "Field & Stream" May, 1950

HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

The Champion

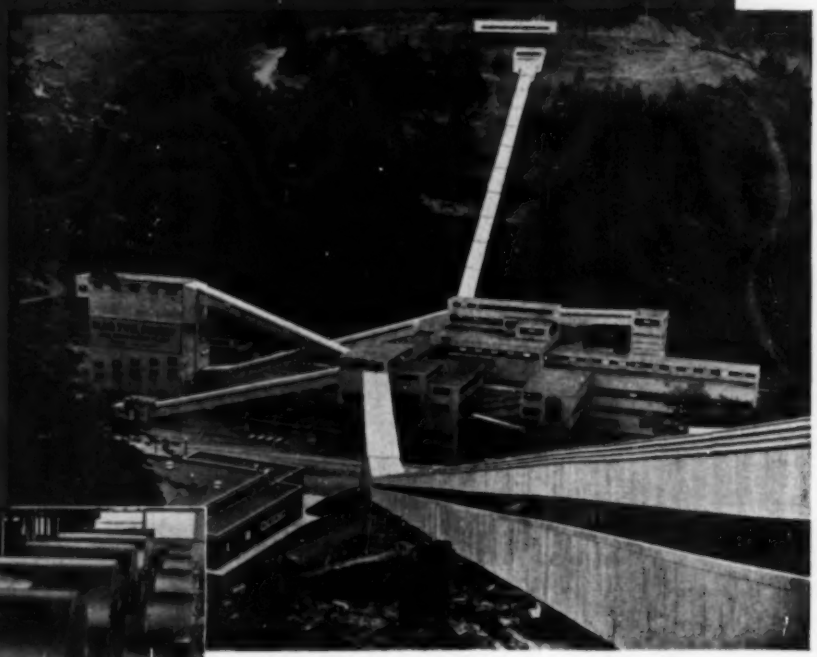
...IN COAL MINE LUBRICATION

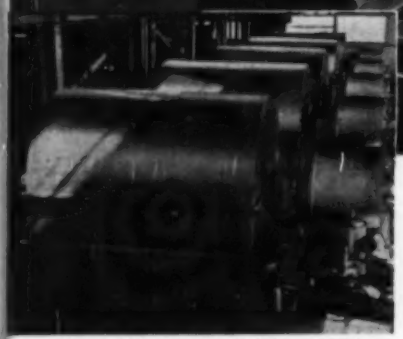
Hulburt Quality GREASE

"The Champion"

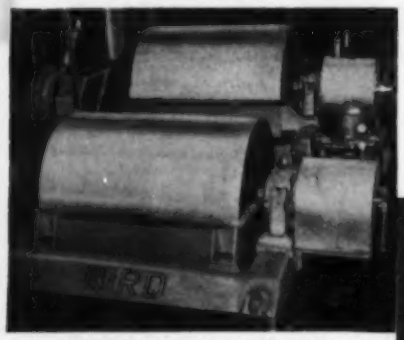
And in this corner, in a well-known drum wearing blue with red, the unbeaten and unbeatable all-time Champion in the field of coal mining machinery lubrication—HULBURT QUALITY GREASE. There's plenty of water down in the mine, mostly acidulous, plus grit and grind and friction, to cause lubrication troubles — but keep your machines greased with HULBURT and they'll streak like silver trout to do your bidding . . . and that's no fish story!

8 BIRDS AT INLAND





These Bird Coal Filters handle all of the washed fine coal at this big plant.



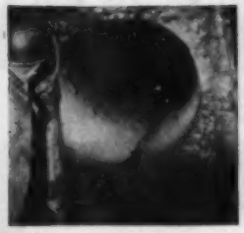
These Bird "Polishers" get some of the high ash, extreme fines out of the cleaning circuit.

● At Inland Steel's great new Link-Belt built Preparation Plant, Price, Ky., BIRD Coal Filters help maintain 750 ton per hour capacity by getting the washed fine coal dry—as dry as can be obtained by any mechanical means. Cost per ton is low. Operation is continuous.

In plant after plant BIRD Coal Filters are proving the modern, efficient, low cost way to dry fine coal. Ask us what they can do for you.

BIRD MACHINE COMPANY
SOUTH WALPOLE, MASSACHUSETTS

Coal Age



THIS MONTH'S COVER

THIS AIRWAY 42 in. in diameter is an example of the work being done by a new boring unit for crosscuts and airways in pitching coal at the Roslyn (Wash.) mines of the Northwestern Improvement Co. The complete story on this new tool, and on the "helldiver" used for sinking slopes, is one of the top features scheduled for the May issue.

COMING IN APRIL

- **The Next Half-Century in Anthracite**—A review of the developments in the past 50 years and a forecast of what may be expected in the next 50. A similar study of the bituminous industry is slated for presentation later in 1951.
- **Coal Cleaning**—Two features discuss present trends in mechanical cleaning and describe a new southern plant using a new type of washing unit.
- **Cutting Strip-Hauling Costs**—What a year's experience with a 400-hp diesel engine for a 70-ton semi-trailer has shown at Tiger mine.
- **Plastic Sealing of Roof and Stoppings**—Methods, costs and results at mines of the Christopher Coal Co., in Northern West Virginia.
- **Plus** additional operating features on mine modernization, mine power centers and automatic controls for small pumps.

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SMOOTHER HYDRAULIC —NO UNSCHEDULED

Avoid harmful rust, sludge and foam by using . . . TEXACO REGAL OILS (R & O)

Charge the hydraulic systems in your stripping shovels, cutters and other equipment– above or below ground–with *Texaco Regal Oils (R & O)* and forget about unscheduled stoppages due to rust, sludge or foam. *Texaco Regal Oils (R & O)* are turbine-quality oils, specially fortified and processed to combat these troublemakers.

With Texaco Regal Oils (R & O) on the job, your hydraulic systems stay clean. This means continuous and smooth pump action, longer pump life, fewer overhauls and lower maintenance costs. *Texaco Regal Oils (R & O)* require no "cutting back" – another advantage over ordinary oils.

There are Texaco hydraulic oils – a complete line of them – to step up efficiency and reduce maintenance costs on all your hydraulic equipment, whatever your operating temperatures or conditions.

Let a Texaco Lubrication Engineer give you full details and tell you about the cost-saving Texaco Simplified Lubrication Plan. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

ASSURE EASIER STARTS

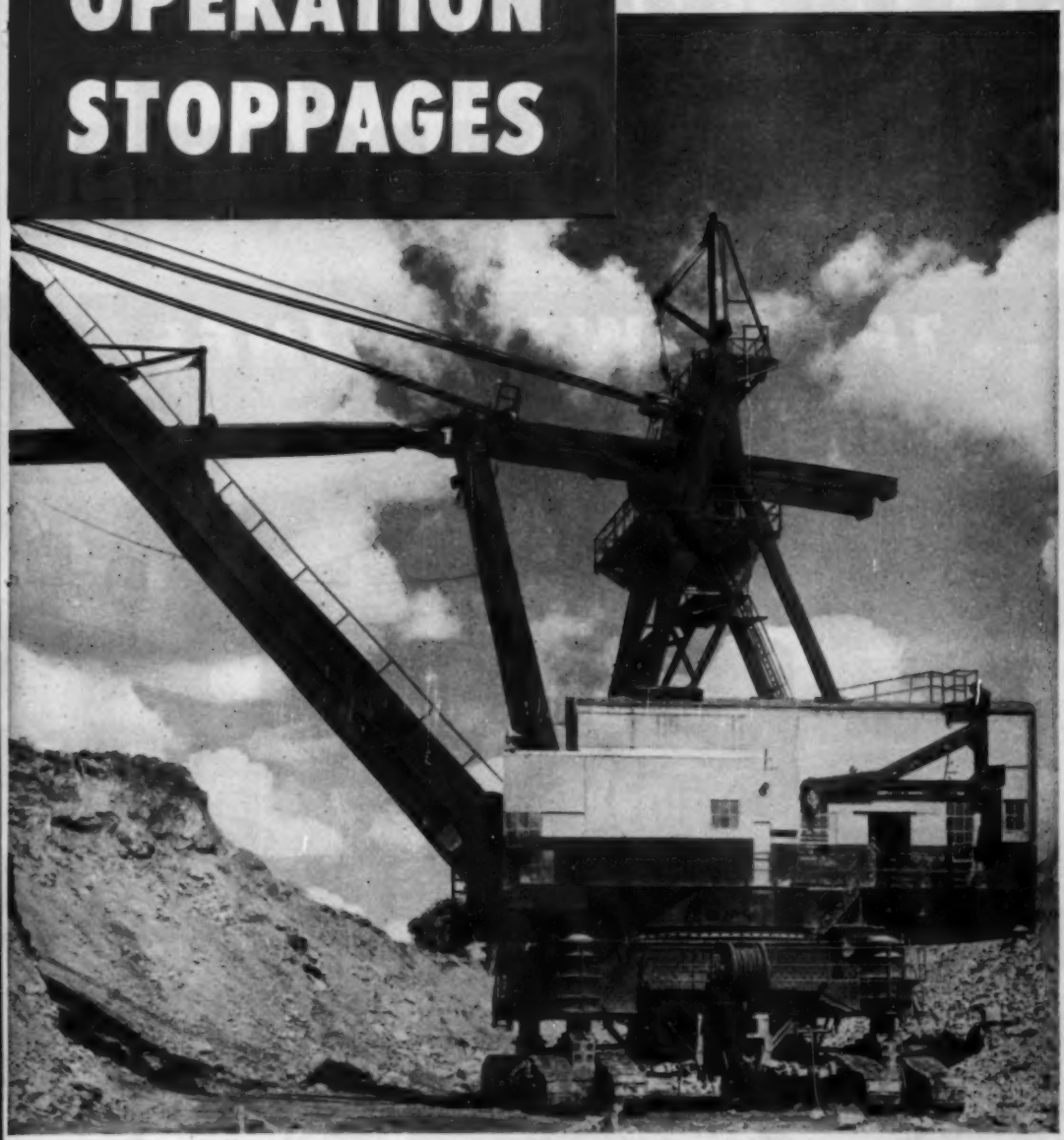
for your auto cars by lubricating wheel bearings with Texaco Olympian Ground. This extra-long-lasting lubricant has remarkable stability, gives full protection the year round, and reduces maintenance costs.

TUNE IN . . . TEXACO presents **MILTON BERLE** on television every Tuesday night. **METROPOLITAN OPERA** radio broadcasts every Saturday afternoon.

TEXACO

TEXACO LUBRICANTS

OPERATION STOPPAGES



For the Coal Mining Industry

ALLIS-CHALMERS
Sets New Standards

. . . THE NEWEST, FINEST

model **HD-20**
Hydraulic Torque Converter Drive
175 net engine hp.
41,800 lb.

model **HD-15**
102 drawbar hp.
27,500 lb.

Get the full story from your Allis-Chalmers dealer.
See these tractors perform. They're built for YOUR job!

for Tractor Performance
for Lasting Durability
for Simplified Servicing
for Ease of Operation

TRACTOR LINE ON EARTH

model **HD-9**
70 drawbar hp.
18,500 lb.

model **HD-5**
40.26 drawbar hp.
11,250 lb.

Originator of the Torque Converter Tractor

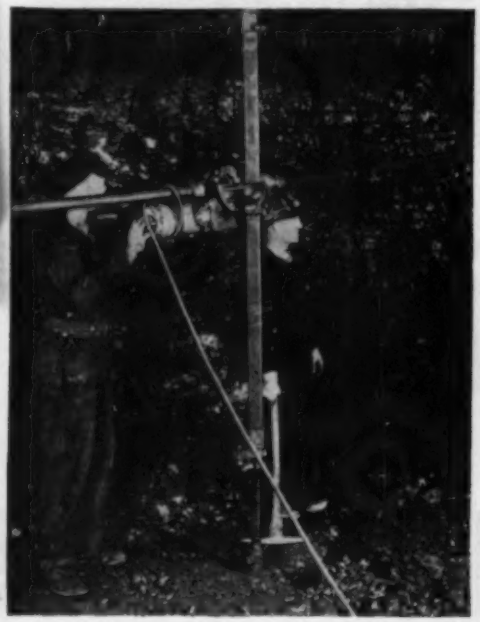
ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

JUST PLAIN YOU

DRAG IT OVER ROCK Many Amerclad Cables are built especially for service like this, and they're a wonderful investment in safety and trouble-free operation. Cables can be furnished with that famous American Steel & Wire Company development—PS Shielding, a conducting rubber tape that eliminates many of the disadvantages of metallic shielding . . . prevents corona discharge . . . provides a fool-proof ground circuit.

SUBMERGE IT Pit mining often means that Amerclad must be submerged in standing pools of water *besides* being dragged over sharp rock. The tough Amerprene jacket is just the thing for duty like this: it's practically impervious to moisture, earth acids and alkalies. PS Shielding gives extra protection—it clings tightly to the insulation and eliminates the gaps that cause corona discharge.



USE IT ON THE RAILROAD . . . Amerclad Railway Utility Cable does not need a canvas stocking. The flexible compound-strand-conductor is made from well-tinned and annealed copper wires—covered with a separator of paper or cotton for easy stripping. Oil-resistant Amerprene jacket means extra years of service—for generator leads, car-lighting service, train line connectors and battery jumpers.

. . . . . AND IN MINES Amerclad Cables and Cords are available for just about every mining need . . . from sweat-proof miners' lamp cord to locomotive gathering cable. Jackets are made from flame-resisting Amerprene—a tough, hard-wearing Neoprene compound that will best withstand mine acid water. We furnish cables that conform to all specifications of the Pennsylvania Department of Mines.

...these Amerclad Cables are

Built for Punishment

When you buy Amerclad Cable, you can *pinpoint* your needs. Chances are we can pick a standard cable, right from stock, that will fit your requirements exactly.

For some examples, look at the photographs on these pages. They show some mighty strenuous applications for any type of cable. But each problem was solved with Amerclad—the famous group of rubber jacketed cables manufactured by American Steel and Wire Company.

Standard insulations and jackets are available to withstand heat, oil, flame, sunlight, age and underground mining service. Moreover, you can obtain the widest range of physical construction—to meet the special conditions of industrial, general, mining and railway installations. Write today for detailed specifications.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
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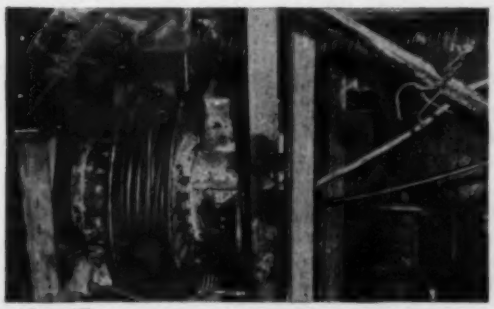
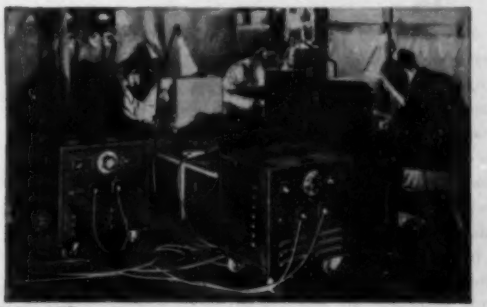


COIL IT The gathering reel in this picture operates continually—24 hours a day. Used in an automatic parking garage, this Amerclad Cable is constantly being coiled and uncoiled. Upstairs, it is dragged through oil and dirt that would ruin all but the very best cables. Service like this is not unusual for Amerclad Cables—they're built to withstand the worst type of mechanical abuse.



FLEX IT Amerclad Welding Cable has to meet some very special requirements. Made from a large number of very fine wires, the cable lies flat, it doesn't kink or snarl and it doesn't strain the operator's wrists while holding the electrode in an awkward position. Like other Amerclad Cables, Amerclad Welding Cable is vulcanized under pressure in a rigid lead sheath. This insures a perfectly smooth surface that resists abrasion and hard usage.

USS

AMERCLAD CABLES

UNITED STATES STEEL

Brasil-Whitehead-Asbell Bros. **Use TOURNAPULLS to**

2 "C's" on 1500' cycles put 352 pay yards of shale-dirt hourly into extinguishing blanket

Back in 1918, government surveyors discovered fire smoldering through coal deposits in the desolate, sage-covered stock country 50 miles northeast of Douglas, Wyoming. Since the coal was of low grade and the section isolated, nothing was done to extinguish the fire for 32 years. Last summer, however, the U. S. Bureau of Mines, in order to conserve natural resources for an expanding national economy, contracted with Brasil-Whitehead and Asbell Brothers, of Riverton, Wyoming, for 600,000 cubic yards of extinguishing fill . . . specifying that the material had to be borrowed from nearby hills and spread in a 10-ft. blanket over the 40 acres still burning. The contractor assigned all dirtmoving to 2 electric-control C Tournapulls. Here's typical performance:

1500' round trip every 3.15 minutes

On 1500' cycles over rough, hilly haul roads, each hustling Tournapull delivered a load every 3.15 minutes . . . made 16 trips an hour. Loads, with 163 h.p. pusher, averaged 11 pay yards in mixed shale, rock, and clay. That's 176 pay yards an hour for each "C" . . . and 352 yards hourly for the 2 electric-control Tournapulls.

Average 27 m.p.h. from town to job

Tournapulls showed a lot of other speed advantages which Brasil-Whitehead and Asbell liked. As an example, to reach the isolated coal field, both "C's" drove 58 miles across unimproved roads from the rail station at Douglas in just 2 hours and 10 minutes. This saved truck, trailer, loading and blocking expense on the town-to-job move . . . moreover, equipment went right to work as soon as it arrived at the job site.

We have hundreds of job reports showing actual field performance of these electric-control, rubber-tired Tournapulls on highways, dams and other construction projects all over the country. Ask us to send you a selection of data on jobs like yours, and see for yourself the kind of production you can get by modernizing with these high-speed rigs. Don't delay — get your order in as soon as possible. Call your LeTourneau Distributor NOW!

LETOURNEAU LET EQUIPMENT

See your LeTourneau Distributor NOW for complete information

smother 32-YEAR-OLD COAL FIRE

Hauls
down 5% grade for 405'
35 seconds

Spreads
down 20% grade for 120'
15 seconds

Returns
up 12% grade for 200'
up 8% for 300'
up 3% for 400'
99 seconds

Total 1500' cycle, 3.15 minutes

LETOURNEAU JOB-PROVED **TOURNAPULLS**

FOR LOWEST NET COST PER YARD

. . . for proof of **better pumping performance!**

It's been said that split-case centrifugal pumps look pretty much alike. But looking alike does not mean "like" performance!

We've lifted the casing of a Fairbanks-Morse Single-Stage Split-Case Centrifugal to show you why you get *better* performance . . . *lower* maintenance costs with Fairbanks-Morse . . . to show you important design and manufacturing differences.

Note the sturdy construction and exceptional strength provided by the arched casing and solid pump base . . . the ease with which the entire pump can be inspected or the entire rotating element removed without disturbing driver or pipe connections. Exceptionally smooth water passages reduce friction and "back eddies" to the minimum. Bearing brackets, cast integrally with pump body, maintain accurate, permanent alignment of shaft and impeller. Smooth, one-piece impeller reduces wear and maintains efficiency. Impeller is pressed on shaft over a key so that the key also drives the shaft sleeves and prevents destructive rotation of the sleeve on the shaft. Removable casing and impeller wearing rings assure easy maintenance and have streamlined water guiding surfaces for maximum pump efficiency.

These are but a few of the many performance-making features you'll find in Fairbanks-Morse Centrifugals. Your Fairbanks-Morse Pump expert will be happy to give you the complete story on these efficient, economical pumps. See him or write Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE,

a name worth remembering

PUMPS • SCALES • ELECTRIC MOTORS
GENERATORS • LIGHT PLANTS • DIESEL,
DUAL FUEL AND GASOLINE ENGINES

What's your CPT*?

* **Cost per ton** goes down when you change to Goodyear's special purpose tires. Cost-conscious coal haulers agree *it pays to BUY and SPECIFY Goodyear!*

Proof of preference: MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND!

ROAD LUG

For trucks that operate both OFF and ON the road, this dual-purpose tire is best. Tough construction and special tread design provide super-traction off the road—long, smooth mileage on the road.

HARD ROCK LUG

For tire-bruising, heavy-duty off-the-road work, this super-rugged tire is tops. Its tough armored carcass and extra heavy lugs assure more wear, better performance no matter how tough the going.

GOODYEAR

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

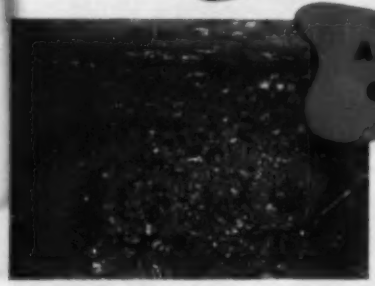
Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron

Gently DOES IT

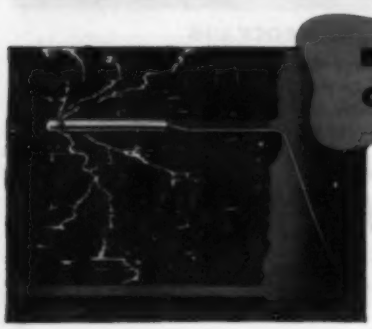
Non-Explosive

MINING METHODS

AIRDOX
CARDOX



Note the high percentage of fine sizes in this full of coal. Typical with permissible explosives.



AIRDOX or CARDOX dislodges coal with a piston-like action that produces more loose coal and minimizes shatter cracks.

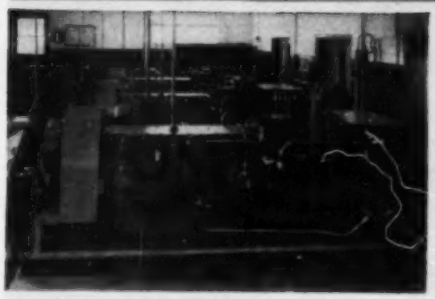
Treat your coal gently— it may be worth more than you know! Let's look at the facts:

When you replace the shattering, hammer-like blows of explosives with the gentle, heaving action of AIRDOX or CARDOX, you get more premium price coal in every ton mined. Specifically, you decrease the minus 2" coal by 10% to 15% and reduce the proportion of minus ¼" coal to an even greater extent. But your increased realization goes far beyond that.

Non-Explosive Mining Methods — AIRDOX or CARDOX — break down the face along natural lines of cleavage. Shatter cracks that cause progressively costly degradation are eliminated. Your coal retains its firm structure all the way from face to furnace — even under extensive mechanical handling, long distance shipment and rough handling in the dealer's yard. *Result: — better coal that's easier to sell.*

Add the factors of greater mine safety, easier loading, easier cleaning — and you can see why the most progressive and efficient mines, in greater numbers than ever before, are changing over to AIRDOX or CARDOX Non-Explosive Mining Methods.

...and pays a reward in GREATER REALIZATION from face to furnace



AIRDOX

AIRDOX at work! Each of these AIRDOX compressors (left) supplies enough high-pressure air to break approximately 750 tons of coal per 8-hour shift.

AIRDOX dislodges coal with compressed air. Its gentle heaving action shears the rib and top clean . . . rolls the coal forward in a loose pile for faster loading . . . reduces hazards of roof failure. It permits on-shift shooting in locations where mine safety laws prohibit use of explosives while men are in the mines. Crews can enter the working face immediately after the fall, enabling greatest possible use of the most modern mechanized equipment.

Equipping a mine to take advantage of the economy and safety features of AIRDOX requires practically no change in operating methods. High pressure air, supplied by one or more electrically driven compressors at the surface, is carried into the working sections of the mine through steel and copper tubing. AIRDOX Tubes are inserted into drill holes in the face. Under the remote control of an operator, they discharge compressed air to break the coal. Force is concentrated at the *back* of the drill hole, where it is most effective. There is no smoke, flame or fumes and very little dust. AIRDOX Tubes may be used over and over again.

Operating control valve which releases compressed air in AIRDOX Tube to dislodge coal.

which for you—AIRDOX or CARDOX?

Each offers you the benefits of greater realization, greater safety and more salable coal. Recommendations as to whether CARDOX or AIRDOX better suits your needs will be made after examination of all factors by one of our engineers. Ask for this free survey today. This may well be your first step toward maximum profits from your mining operations.

CARDOX

CARDOX utilizes the gentle but tremendously powerful force exerted by expanding carbon dioxide to dislodge coal. Method of application at the face is in general similar to that for AIRDOX. The CARDOX Tube containing carbon dioxide is inserted in the drill hole. Discharge is directed from a convenient crosscut. Discharge does not damage the CARDOX Tube. The Tube is simply returned to the surface for refilling in a small charging plant located at the mine.

In addition to the benefits it confers through greater realization, CARDOX offers unique safety advantages. It cannot initiate an explosion, will not support combustion. Carbon dioxide is a fast, effective fire extinguishing agent. In many mines CARDOX Tubes are featured as emergency fire extinguish

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS

RESEARCH, DEVELOPMENT AND TESTING
CO-ORDINATED ENGINEERING DESIGN
DO NOT LUBRICATE
Life-Linestarter
PAIRED FOR PRODUCTION
Life-Line motor

EXTRAS like these assure long-range performance

You get more than a motor and a starter when you install these Life-Lines. You get complete design, engineering and service every step of the way.

CO-ORDINATED ENGINEERING DESIGN makes sure that Life-Line motors and Life-Linestarters give long-range performance. They're made together to work together.

RESEARCH, DEVELOPMENT AND TESTING in Westinghouse laboratories result in such features as:

- Steel frame
- Pre-lubricated bearings... in Life-Line motors
- "De-ion"* arc quenchers
- Bimetallic relays . . . in Life-Linestarters*

APPLICATION ASSISTANCE to help you select the right motor and control.

- Application engineers for your daily problems
- Consulting engineers for special design problems
- Field offices in 123 locations for all your service requirements

All at your service without obligation.

UNIFIED RESPONSIBILITY . . . for operation of the motors and protective controls.

One supplier . . . makes your work simpler.

MAINTENANCE SERVICE is all-inclusive and nationwide.

- 36 fully-equipped repair shops
- 52 engineering and service offices

Who else can offer all these EXTRAS?

More details? Ask your Westinghouse representative. Call him today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21637

YOU CAN BE SURE... IF IT'S Westinghouse

Life-Line MOTORS and CONTROLS

MACWHYTE

For better service and more economy

Order from *a thousand and one*

MACWHYTE WIRE ROPES

In the complete Macwhyte line are Internally Lubricated PREformed Wire Ropes for all equipment—plus Galvanized, Stainless Steel, and Monel Metal Wire Ropes. Special assemblies of Macwhyte Wire Rope and Industrial Standards "Safe-Lock" fittings. Fittings swaged to rope in assemblies made to order.

MACWHYTE SLINGS made to order

All types, sizes and lengths. Macwhyte ATLAS Round-Braided Slings, Drew Flat-Braided Slings and Monarch Single-Part Wire Rope Slings are all made to order for each job.

WHATEVER YOUR NEEDS

for wire rope, slings, special assemblies, solutions for special problems, call a Macwhyte distributor or write Macwhyte Company. Catalog on request.

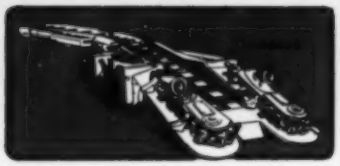
MACWHYTE COMPANY *2931 Fourteenth Avenue, Kenosha, Wisconsin. Manufacturers of Internally Lubricated Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope. Our distributors and mill depots throughout the U.S.A. and other countries carry stocks for immediate delivery. Mill depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles*

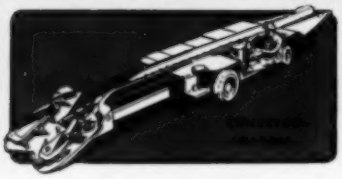
Here 'Tis

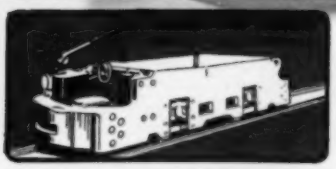
A NEW JEFFREY SHUTTLE CAR

- **NEW Chassis type body design—rigid construction**
- **Improved body design—easy loading and discharging**
- **Heavy oversize wheel units**
- **Liberally designed electric motors**
- **Disc type Hydraulic Brakes (Goodyear)**
- **Improved Hydraulic Booster Steering**
- **Large space for Operator—easy and comfortable operation**
- **All equipment mounted to improve maintenance**
- **Improved Hydraulic Drive for the Conveyor**

The above features have been incorporated into the design of the new Jeffrey Shuttle cars to give you ***greatly improved performance,*** easier operation and lower cost per ton mined.

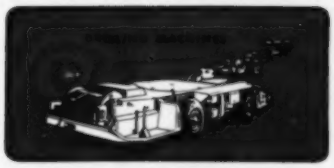


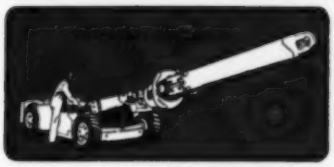


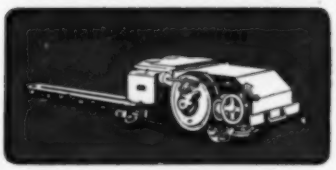


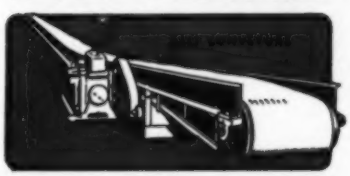
JEFFREY

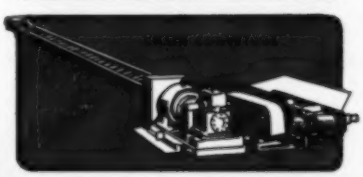
EQUIPMENT FOR COAL MINES











THE JEFFREY MANUFACTURING COMPANY

Established 1877

General and Export Sales Offices

COLUMBUS 16, OHIO, U. S. A.

DISTRICT SALES OFFICES

BALTIMORE 2, MD. Munsey Bldg.
BECKLEY, W. VA. 403 City Ave.
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BUFFALO 2, Jackson Building
CHICAGO 1, Bell Building
CINCINNATI 2, Carew Tower
CLEVELAND 15, 1560 Hanna Bldg.
DENVER 2, Ernest & Cranmer Bldg.
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HOUSTON 2, TEXAS City National Bank Bldg.
JACKSONVILLE 2, Barnett Bank Building
MILWAUKEE 2, 735 N. Water Street
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ST. LOUIS 1, Railway Exchange Bldg.
SCRANTON 3, 122 Adams Avenue

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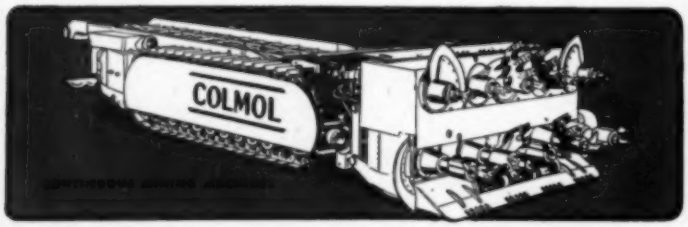
In West Virginia: BECKLEY — CABIN CREEK — LOGAN — MORGANTOWN — WELCH

ASSOCIATED COMPANIES

JEFFREY MFG. CO. LTD., Montreal, Canada
JEFFREY-GALION (PTY.) LTD., Johannesburg, S. A.
THE OHIO MALLEABLE IRON CO., Columbus, Ohio
BRITISH JEFFREY-DIAMOND LTD., Wakefield, England
THE GALION IRON WORKS & MFG. CO., Galion, Ohio
THE KILBOURNE & JACOBS MFG. CO., Columbus, Ohio



Bagdad Copper Corporation's Arizona plant chose Gates Vulco Rope Drives for these big Ball Mills because of the proven ability of Gates Vulco-Ropes to handle this rugged service.

This Simple Test Tells WHY the Concave Sides of Gates Vulco Ropes Mean *Longer Belt Life!*

Prove this *yourself*—in two minutes' time.

Take any V-belt that has *straight* sides. *Bend* that V-belt while you grip its sides between your fingers and your thumb. You will *feel* the sides of the belt *bulge out*—as shown in figure 1-A, below.

Clearly, that outbulge forces the sides of the belt to press *unevenly* against the V-pulley—and this concentrates the *wear* where the bulge is greatest.

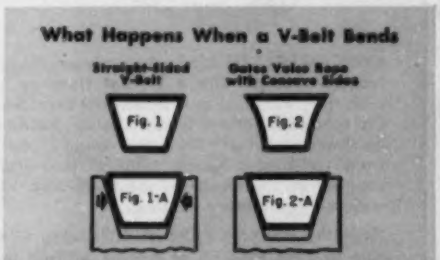
Now, make the same test with the belt that is built with the Concave Sides—the Gates Vulco Rope.

Figures 2 and 2-A show clearly what happens when you bend a Vulco Rope. Instead of *bulging*, the precisely engineered Concave Sides merely *fill out* and become perfectly straight. There is no side-bulge. This belt, when bent, precisely fits its sheave groove.

Because there is *no bulging*, the sides of the Gates Vulco Rope always grip the *full* face of the V-pulley *evenly* and therefore wear *uniformly*—resulting in *longer belt life* and *lower belt costs for you.*

Only V-belts made by Gates are built with concave sides. Whenever you buy V-belts, be sure that you get the V-belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave-Groove, Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill Out to a Precise Fit in the Sheave-Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

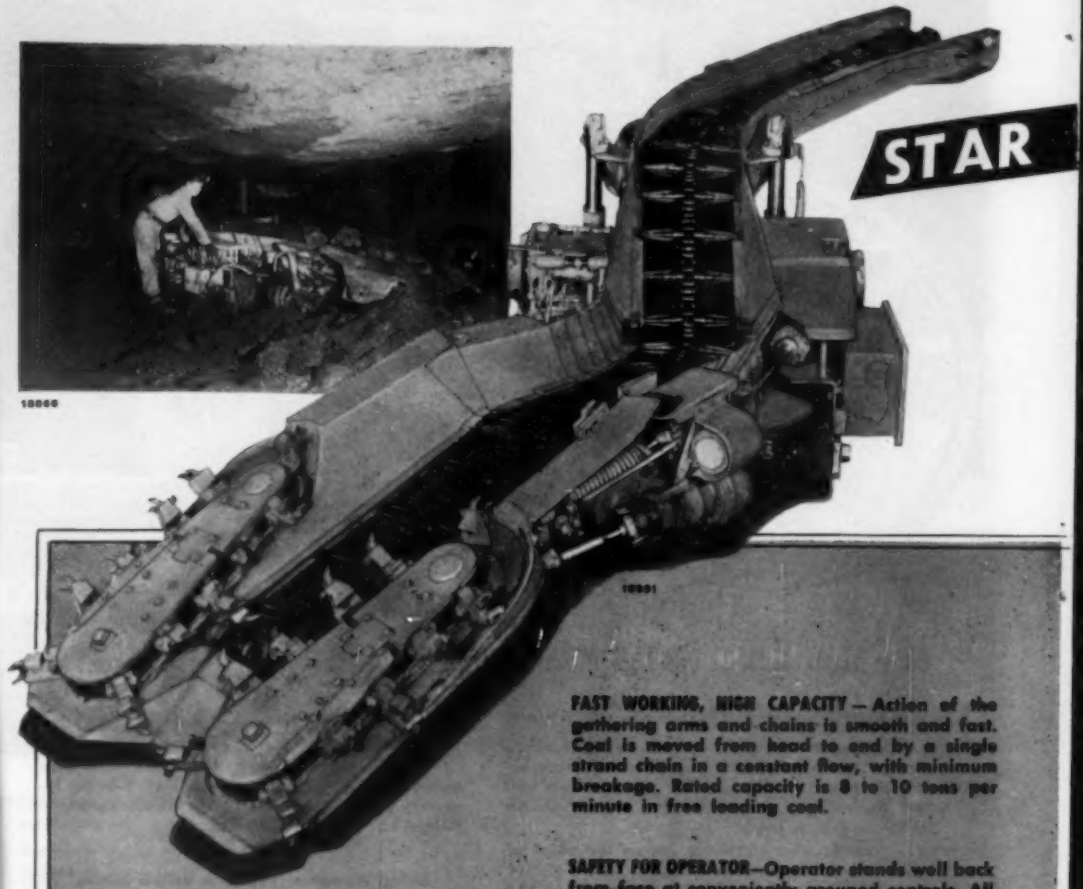
CS-511

THE GATES RUBBER COMPANY
DENVER, U. S. A.
The World's Largest Makers of V-Belts

Gates VULCO ROPE DRIVES
Engineering Officers and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

Goodman TRACTOR TREAD LOADERS

18868



18891

SWINGING LOADING HEAD—An exclusive Goodman feature that permits a 17-foot clean-up width with only forward and backward movement of the machine. Bottom is not torn up. Posting can be close to the face. A vertical range of the head from 10" below bottom to 30½" above allows digging of tight coal at most effective height, without preliminary picking.

SWINGING DISCHARGE END—A 40° swing to either side permits loading at angles without loss of time or capacity. Can also be raised or lowered to shuttle car height.

FAST WORKING, HIGH CAPACITY—Action of the gathering arms and chains is smooth and fast. Coal is moved from head to end by a single strand chain in a constant flow, with minimum breakage. Rated capacity is 8 to 10 tons per minute in free loading coal.

SAFETY FOR OPERATOR—Operator stands well back from face at conveniently grouped controls. All movements of machine are within range of vision; all are secured through quickly responsive hydraulic controls.

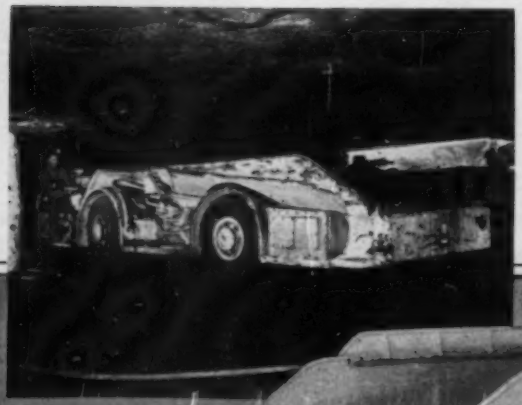
The Goodman Type 660 loader has a 22" coal line height, and an over-all height of 31". The Type 665 is 43" over-all in height, with a greater ground clearance for soft bottom and is suited for discharge into large shuttle cars.

Goodman MANUFACTURING COMPANY

. and SHUTTLE CARS

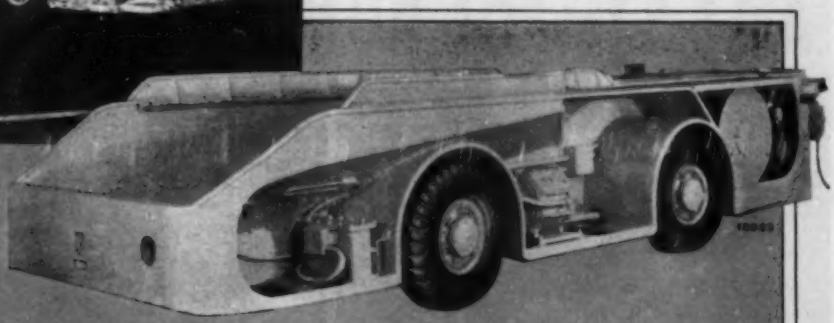
PERFORMERS INDIVIDUALLY

Ideal as a team!



Depend on Goodman to produce the *right combination* — the ideal pair for peak performance in loading and transporting.

In a typical section of a modern mine, records for a three-month period showed an average of 592.3 tons per shift in 62" coal. With a 14-man face crew, the average tonnage per man per shift was 42.3.



EAST STEERING—Four-wheel mechanical steering with a hydraulic booster. Little effort is required of the operator. Can be steered manually should power or hydraulic system fail.

HYDRAULIC BRAKES—Automotive truck type or airplane disc type brakes are available. Either may be locked to hold car on an incline. A supplementary emergency brake can be furnished.

AUTOMATIC CABLE REEL—Correct cable tension is maintained at all times, regardless of direction of travel. Reel is hydraulically driven and has an automatic spooling device.

DRIVE—Four-wheel, with controls on left- or right-hand side. Dual levers and switches permit operator to face in direction of car travel at all times.

Goodman builds a complete line of cable reel shuttle cars in basic heights of 35" to 48", with or without adjustable height discharge. On all cars, side boards can be added to increase capacities.

Before you decide on any, see this equipment on the job. Write now, and we'll have a Goodman sales engineer arrange a mine visit where you can see for yourself how its exclusive advantages can mean more tonnage.

At the Coal Show
CLEVELAND, OHIO
May 7-12
Be sure to see Goodman machines in operation. Meet us at booths 2483 and 2483.

HALSTED ST. AT 48TH · CHICAGO 9, ILL.

A TON OF DUMPTOR STRENGTH.

FAST, EASY SPOTTING . . . In confined underground operation, Dumptors spot fast, close to shovel . . . no need to turn. Big flared 8' x 8' body permits loading over end or sides. Shovel operator has unexcelled impact, less spillage, short swings.

NO-TURN SHUTTLE HAUL . . . Dumptors travel same speed forward and reverse . . . save slow jockeying back and forth at the loading unit, on the haul, at the dump. Yet, Dumptors have plenty of maneuverability . . . turn in a tight circle at 19'-6" radius.

TO stand up under the most severe loading shocks of mine, quarry and construction service, Koehring Dumptors have more than a ton of net vehicle weight for every ton of payload. Sides, end and bottom of all-welded 6-yard body are heavily reinforced with 4" channel ribs. More than triple strength built into the bottom cushions shocks of rock loading. Seasoned 1⅝" oak timbers are securely bolted between two layers of 5/16" steel plate. Free-swinging kick-out pan adds another tough 3/16" high-manganese steel plate to Dumptor bottom for extra protection.

To withstand punishment of rough, off-road hauling, there's plenty of strength, too, in the heavy-duty chassis. Dumptor has rugged main frame of 8" ship channels, heavily trussed . . . 1-piece steel drive-axle housing and transmission case . . . 4" chrome steel drive axles . . . cast alloy steel "I" beam steering axle. There are no leaf springs . . . just one big, double-coil chassis spring on steering axle . . . none on drive axle. Big, shock-absorbing drive tires eliminate need for more. That means no spring maintenance.

For fast acceleration, less shifting, more grade-ability, Dumptors also have 6 HP for every ton of gross weight . . . climb grades up to 24% fully loaded. Learn, too, how 1-second gravity dump eliminates body hoist maintenance . . . saves 15 to 25 seconds on every cycle with Dumptors. Get all the facts from your Koehring distributor.

KOEHRING Company
Milwaukee 16, Wis.

KOEHRING (KOEHRING HEAVY DUTY) **DUMPTOR®**

3 NEW WAYS TO INCREASE SAFETY and IMPROVE PRODUCTION, TOO!

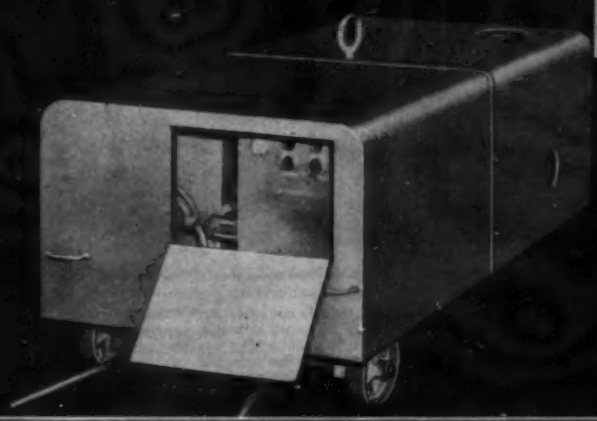
1. M·S·A MinePhones

Dispatcher can immediately transmit any or all messages at any point in the mine

Each workman can talk with dispatcher, or with each other, anywhere in mine while trips are moving

Users of the M.S.A. MinePhone Communication System report elimination of hazardous "trip-bopping", plus improved traffic flow, as immediate benefits of the installation. Dispatcher's orders go simultaneously to all workmen, who can reply or communicate at any time with each other while trips are in progress. System uses frequency modulation to give high quality voice communication for hundreds of feet in important new safety-production step ahead. Ask for Bulletin No. AU-5.

2. M·S·A *All-Electric* STEAM CLEANER



Removes dirt and grease deposits from mining machinery in one-tenth the time required by other means. Eliminates serious fire hazards, puts equipment back into service faster, and decreases wear and maintenance. Mining machinery can be cleaned between repairshop visits. All-electric, no flame, no danger, one man operation. Patented, and built under Homestead-Yeager design, it is supplied in two models—Standard and U.S. Bureau of Mines Approved. For details of design and operation, and evidence of how this new M-S-A All-Electric Steam Cleaner can help you to increase safety and step up production, ask for Bulletin No. AP-1.

3. M·S·A BANTAM HIGH PRESSURE ROCK DUST DISTRIBUTOR

Tops in safeguarding your operations—for it can effectively maintain adequate rock dust right up to the working face. It's economical—for the minimum volume of air under high pressure discharges a rich stream of dust, that sticks on roof or rib—with minimum loss in ventilating currents or floor deposits. Readily transported: can be carried on shuttle car, belt conveyor, its own rubber-tired truck, or on a light track-mounted truck. Other models of rock dust distributors from the lightweight FaceDuster to the heavy duty Type "S" are available to meet your every requirement. Complete details gladly supplied on request.

MSA

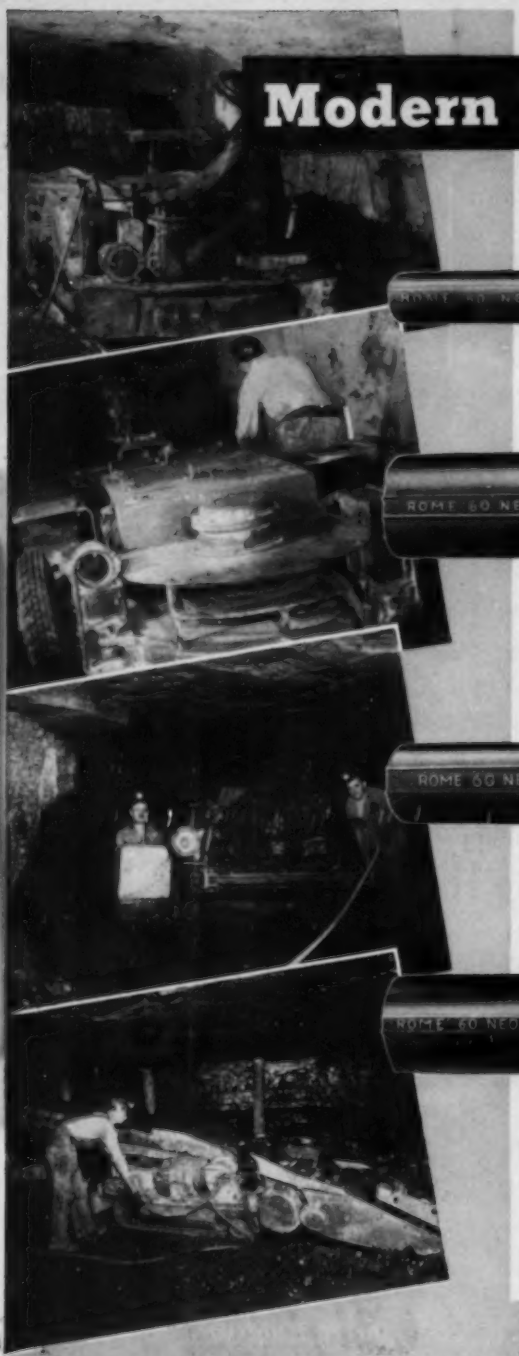
SAFETY EQUIPMENT HEADQUARTERS

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STS., PITTSBURGH 8, PA.

54 BRANCH OFFICES IN THE UNITED STATES AND CANADA

When you have a safety problem, M.S.A. is at your service. Our job is to help YOU.



Modern Mechanization

Rome Cable manufactures a complete line of cords and cables for mine use, each made for maximum service and economy. Compliance with Federal and Pennsylvania safety codes is indicated by "P-105 BM" molded in the Neoprene sheath.

Rome 60 Single Conductor Locomotive Gathering Cable—600 Volts

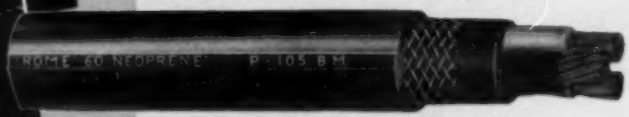
Strong adhesion between conductor and insulation, as well as between insulation and a tough Neoprene sheath, plus small diameter and extreme flexibility, makes this the ideal locomotive cable.

Rome 60 Parallel Duplex (Flat Twin) Mining Machine Cable—600 Volts
(with or without grounding conductor)

Here is the popular shuttle car cable of flat construction for compact reeling. Balanced adhesion between components combines ease of stripping for splices and firmness of outer sheath. Neoprene webs between insulated and grounding conductors provides extra protection . . . plus maximum resiliency to mechanical injury.

Rome 60 Concentric Mining Machine Cable—600 Volts

This is a two-conductor cable providing maximum flexibility and minimum diameter in a round construction. The second conductor is concentrically stranded around the insulated center conductor. Recommended for use on cutting machines and other off-track equipment.



Rome 60 Portable Power Cables—Two, Three and Four Conductor

Type W (Ungrounded) up to 3000 volts
Type G (Grounded) up to 5000 volts

This heavy duty portable power cable of multi-conductor construction is particularly recommended for use on electric shovels, loaders, mucking machines, or any equipment where delivery of a heavy power load is required. Conductors are assembled with rubber-like fillers providing maximum flexibility with a non-rotting, non-wicking inner construction . . . plus maximum resiliency to mechanical injury.

IT COSTS LESS TO BUY THE BEST

Requires Modern Cable . . .

Rome 60 MINING CABLES

NEOPRENE SHEATHED . . . MOLDED IN LEAD

Modern mechanization is a strong weapon in the battle against today's high mining costs. But, the productivity of mechanized equipment depends on the cable that delivers the power. It must provide uninterrupted service under the toughest conditions and resist abuse. It should, also, reflect modern engineering in its design. That is why more and more mine operators are switching to Rome 60.

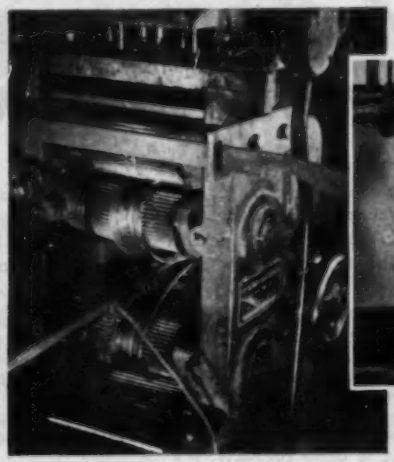
Completely up to date, Rome's manufacturing, research and inspection facilities assure the dependable, uniform quality of Rome 60 mining cables. They can be depended upon for extreme flexibility, properly balanced adhesion between insulation and sheath . . . plus long-wearing Neoprene, molded in lead to a tire-like toughness, for maximum resistance to acids, oils, abrasion, and flame.

Progressive engineering has always kept Rome 60 mining cables *out front*. For example:

- Neoprene sheaths were utilized long before flame resistance was required by law.
- Adoption of heat-resistant insulation permits 75° C. continuous operation, providing higher current carrying capacities and overload protection.
- Inclusion of Neoprene webs between insulated and ground conductors in Parallel Duplex construction provides *extra* protection, without the use of fibrous components.

For your next mining cable requirement . . . specify Rome 60 and see for yourself.

Application of the Rome 60 Neoprene sheath is closely controlled.



Removal of lead mold produces a tough, wear-resistant sheath.

Notarized flame tests are well within permissible propagation.

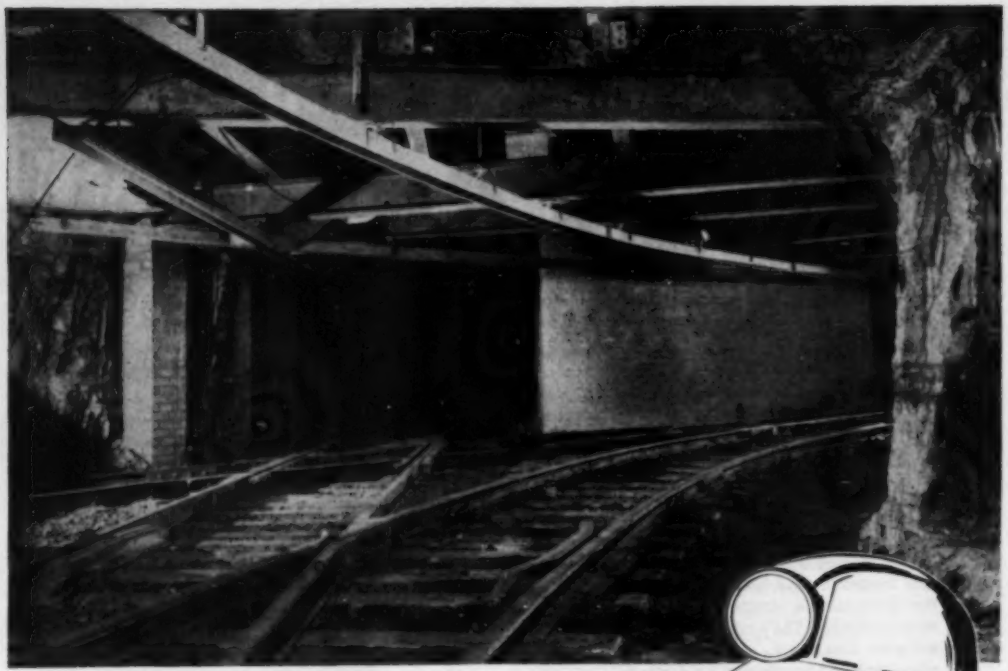
See Rome at the Bluefield Coal Show August 16-19

ROME CABLE *Corporation*

ROME • NEW YORK

From Ore to Finished Wire

ROME CABLE ROME, N.Y.



"Down in this coal mine we run quite a railroad"

"Our problem is getting coal out as fast as we can, and that means a well-organized railway — right here in the mine. Because of our fast trips and big loads, we use 80-lb rail in main haulage tracks. Heavy? Sure, that's heavy rail for mines, but we've found it pays. A mine like ours *needs* the heavier rail."

• • •

The above, quoted substantially as we heard it from an experienced mining man, bears out what Bethlehem has advocated for some time: the use of 70-, 80-, and 90-lb rail in main haulageways. For years, 60-lb was considered adequate; but today's huge cutters, loaders, 20- to 35-ton motors, and king-size cars necessitate a heavier track structure.

Heavy rail stands up better, requires less maintenance . . . enables faster trips . . . means less frequent replacement . . . saves wear and tear on the roadbed when ballasting is done properly. It's definitely recommended for long-range economy under present conditions and those contemplated under a 20- to 30-year program.

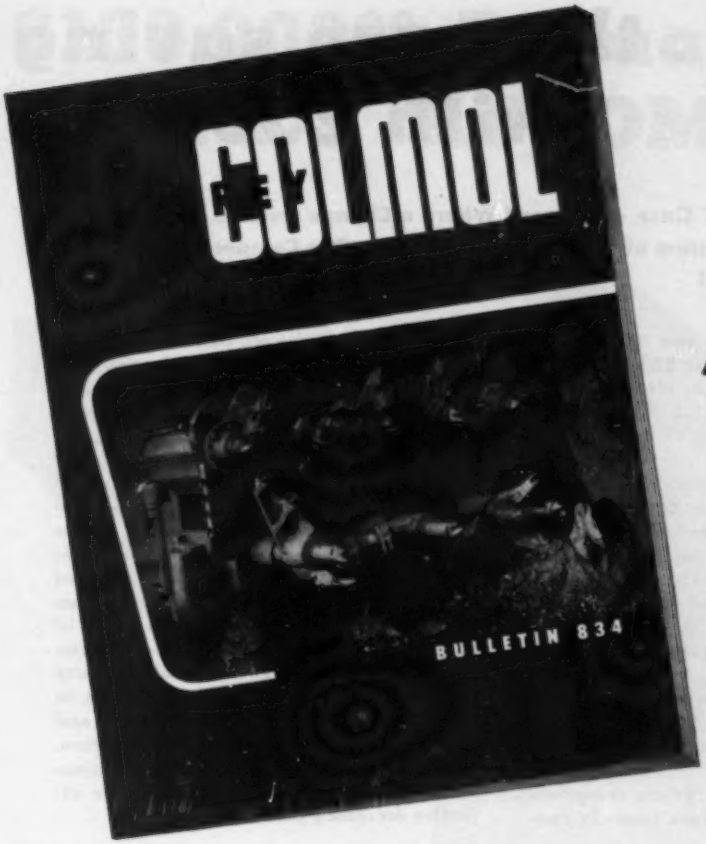
Bethlehem will gladly furnish you frogs, switches, and prefabricated layouts in any standard rail weight you desire, but strongly recommends the heavier sections when you open new mines or change present haulageways. See us for full details—we'll be glad to co-operate in every possible manner.

Left to right: comparative sections of 70-, 80-, and 90-lb mine rail.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation



A NEW BULLETIN

SEND FOR IT

Just off the press . . . 12 pages of useful information covering the COLMOL which mines and loads in one operation without the use of explosives. This NEW Bulletin tells HOW IT WORKS . . . gives the various sizes and models and all features of construction and operation.

The COLMOL, a new and important contribution to coal mining, forecasts greater output, greater economy and greater safety. This one-process device eliminates the need of three separate machines for cutting, drilling and loading. It is completely hydraulic in operation.

The coupon below is for your convenience (or make request on Company letterhead) . . . fill it in and mail.

THE JEFFREY MANUFACTURING COMPANY

912 North Fourth Street, Columbus 16, Ohio

YES . . I would like to have more information about the Jeffrey COLMOL — Continuous Mining Machine

Name .....

Position .....

Company .....

Address .....

NOW . . . they are saving with 250 New

Another Actual Case on Record Where a Change Over to the S-D "Automatic" System of Coal Haulage Is Saving One Company Thousands of Dollars!

Recently we advised you of a small tonnage mine that is saving $24,000.00 annually, in man hours alone, after changing over to 16 new S-D 1-2-3 "Automatic" Mine Cars.

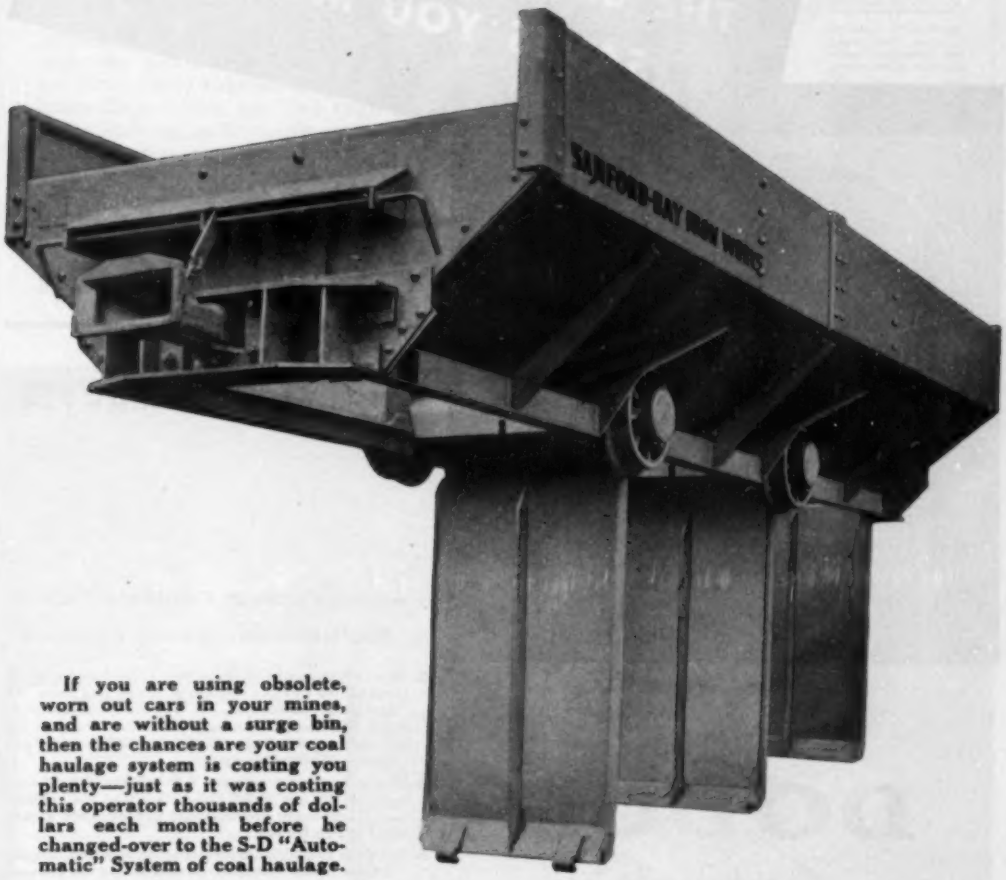
We told you that not every change-over, of course, offers the same opportunity for cutting costs, but in every case large savings are obvious. For instance, here is another actual case on record in which a large coal company reports that with the recent change-over to the S-D "Automatic" System of coal haulage, and installing 250 new S-D 1-2-3 "Automatics" they have been able to save 25 man-shifts per day. This is an approximate saving of $100,000.00 each year, based on 250 working days annually.

The S-D "Automatic" System comprises any number of required cars (usually one-third to one-half the old cars) plus an adequate surge bin. This combination has proved beyond question its advantages. A surge bin of sufficient capacity is essential to constant coal production and low cost operation. First, it permits full time mine operation with only part time operation of screening plant. Second, it guarantees independent non-stop operation of either screening plant or mine in case of temporary shut-down of one or the other. Use of the bin is possible only with drop-bottom "Automatic" cars and no other type of haulage. Regardless of size, S-D "Automatics" take full advantage of bin capacity and fill it level with tracks. This bin is, in fact, the control point between mine and screening plant for a balanced operation. Incidentally, the bin supplies the continuous, even flow of coal so necessary to effective screening plant operation.

Today, transportation of coal from mine to bin, automatic dumping of coal at bin, 15 to 20 cars per minute and return of cars to mine is one non-stop operation with S-D 1-2-3 "Automatics" and handled alone by the locomotive operator.

If something happens to close down your screening plant, mining goes right on until bin is full, because bin may be filled to level full with S-D 1-2-3 "Automatics." Only the S-D 1-2-3 "Automatic" System of haulage can do this.

$100,000^{00}$ Annually S-D 1-2-3 "AUTOMATICS"



If you are using obsolete, worn out cars in your mines, and are without a surge bin, then the chances are your coal haulage system is costing you plenty—just as it was costing this operator thousands of dollars each month before he changed-over to the S-D "Automatic" System of coal haulage.

Let one of our engineers discuss improvements that will turn your losses into profits. Drop us a line today!

Sanford-Day Iron Works

KNOXVILLE TENNESSEE

THE SPEED REDUCER THAT SAVES YOU MONEY!

Dodge

Torque-Arm

America's Most Complete Line of Shaft-Mounted Speed Reducers

- No special engineering required. No foundation to provide. No flexible couplings. No sliding base. No "lining-up" difficulties. No expensive installation. Stock TAPER-LOCK sheaves prescribed for each job to provide desired speeds. Application to other machines is practical and easy.
- Unit is driven through any V-Belt Drive. Torque-arm, fastened to any fixed object, anchors the reducer unit. Turnbuckle provides fast and accurate adjustment of belt tension.
- Backstop available from stock when required. Simple. Positive. Easily installed. Sealed inside the reducer housing.
- Compact, light weight, *rugged*. Quality built by Dodge for Dodge *dependable* service.
- Built in two series—Single and Double Reduction. Capacities from 1 to 27 h. p. Speeds from 12 to 330 rpm. Available from distributors' stocks.
- WRITE for special bulletin A602.

DODGE MANUFACTURING CORPORATION, 3000 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new cost-saving methods. Look for his name under "Power Transmission Equipment" in classified phone book.

FIRST IN POWER TRANSMISSION MACHINERY!

V-BELTS AND TAPER-LOCK SHEAVES

DODGE-TIMKEN PILLOW BLOCKS

ROLLING GRIP AND DIAMOND B CLUTCHES

SOLID STEEL CONVEYOR PULLEYS

LOCOMOTIVE CABLES

Roebling ROEPRENE Mine Locomotive Cables

last longer . . . cost less on the job!

ROEBLING PUTS EXTRAS into Roeprene Cables . . . gives their outer jackets a special curing that makes them tougher and better able to withstand the roughest sort of wear. They're outstandingly flexible, too. Their single conductor is insulated with a heat- and moisture-resistant compound. The Roeprene sheath is permanently bonded to the insulation by open reinforcing cords.

A big part of Roebling's complete electrical wire and cable line is now required in our nation's rearmament program, but your Roebling Distributor and the Roebling organization will certainly try to render the best service possible. John A. Roebling's Sons Company, Trenton 2, New Jersey.

Tinned, copper conductors, Class G and H, rope stranded for greater flexibility, and increased flex-life.

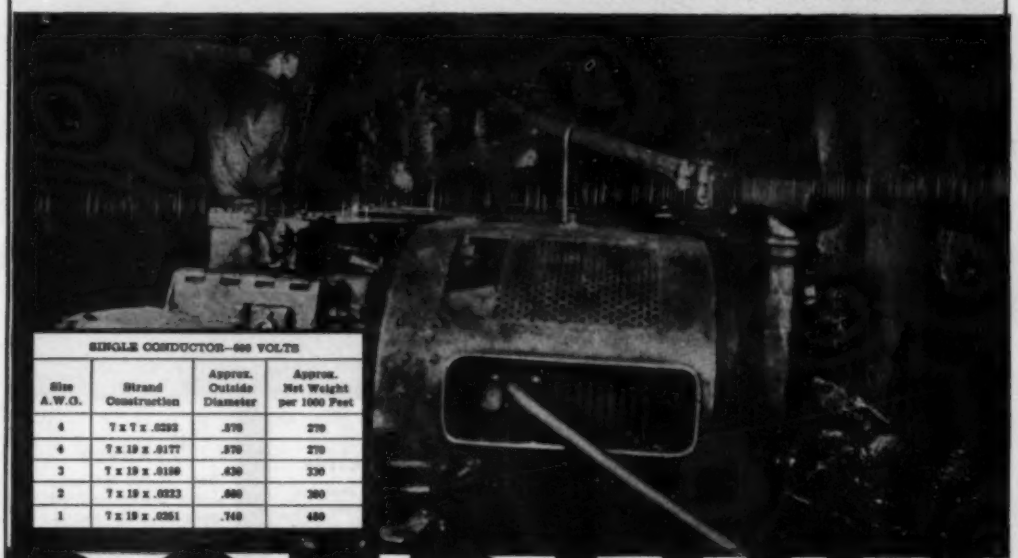
Insulated with high grade heat resistant rubber compound for longer mine service life.

Woven cotton reinforcing imbedded in jacket and insulation, bonding the cable into a solid unit without affecting flexibility.

Roeprene (Neoprene) sheath, lead mold cured for high mechanical strength and resistance to abrasion, sunlight, cutting, oils, acids, greases and alkalies.

FLAME RESISTANT

Roebling Roeprene Mine Locomotive Cables are marked P-111-BM, indicating approval by the Pennsylvania Bureau of Mines, and acceptance by the U. S. Bureau of Mines.



SINGLE CONDUCTOR—600 VOLTS			
Size A.W.G.	Strand Construction	Approx. Outside Diameter	Approx. Net Weight per 1000 Feet
4	7 x 7 x .0292	.570	270
4	7 x 19 x .0177	.570	270
3	7 x 19 x .0199	.630	330
2	7 x 19 x .0223	.690	390
1	7 x 19 x .0251	.740	480

ROEBLING

Atlanta, 934 Avon Ave ★ Boston, 51 Sleeper St ★ Chicago, 5525 W. Roosevelt Rd ★ Cincinnati, 3253 Fredonia Ave ★ Cleveland, 701 St. Clair Ave, N.E. ★ Denver, 4801 Jackson St ★ Houston, 6316 Navigation Blvd ★ Los Angeles, 216 S. Alameda St ★ New York, 19 Rector St ★ Odessa, Texas, 1920 E. 2nd St ★ Philadelphia, 230 Vine St ★ San Francisco, 1740 17th St ★ Seattle, 900 1st Ave, S. ★ Tulsa, 321 N. Cheyenne St

5 reasons why modern mines buy Willison Automatic Couplers

1 SAFE

Willison Automatic Couplers require no manual assistance . . . no need for men to go in between cars to couple or uncouple a Willison Automatic!

2 FAST

All Willison couplers have the same contour . . . can be coupled at either end of car or locomotive . . . no time-consuming reversing is necessary.

3 STABLE

Close coupling of Willison couplers eliminates damaging slack . . . permits higher speeds with maximum stability . . . reduces surging and spilling.

4 PROTECTIVE

Two parts, the head and the lock, do all the work on every Willison coupler . . . take the shocks and strains to protect cars and locomotives from damage.

5 PROVED

Over 50,000 Willisons speed handling and cut costs in mines and industrial plants everywhere. Why not specify Willison Automatic Couplers for your haulage needs?

WRITE TODAY for circulars No. 1746 and No. 5240 for more information on Willison Automatic Couplers. National Malleable and Steel Castings Company, Cleveland 6, Ohio.

A-5345

NATIONAL Products FOR TRANSPORTATION AND INDUSTRY Est. 1860

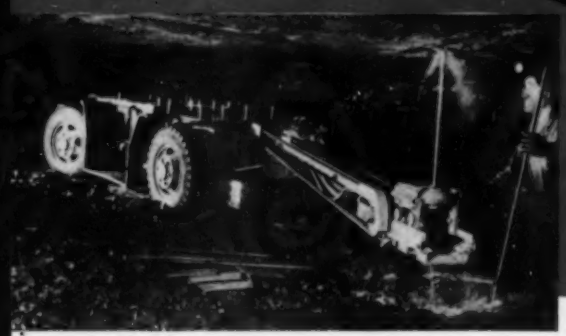
NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

WILLISON AUTOMATIC COUPLERS • NACO STEEL WHEELS • NACO STEEL LINKS and SWIVEL HITCHINGS

ONE-MAN OPERATED . . . SELF-PROPELLED

. . . AND WITHOUT AN EQUAL FOR FAST,

ECONOMICAL ROOF-BOLT DRILLING



HYDRAULIC IMPACT WRENCHES

DRILL-MOUNTED HAND-HELD

the JOY RBD-1 HYDRAULIC ROOF-BOLTING DRILL

★ Built in 26", 30" and 36" heights. Wherever rotary drills are applicable, the RBD-1 consistently out-drills other types—either pneumatic or electric—producing as many as *two-thirds more holes* per shift.

★ Bottoms your roof-bolting holes with only one steel change in practically all cases. Except in the thickest seams, *no other drill* will do this.

★ Rubber-tired and self-propelled—equipped with hydraulic controls for *one-man* operation. Employs boom feed, and is self-leveling and self-aligning while drilling.

★ May be equipped for wet drilling—or with vacuum dust remover, as desired—to eliminate objectionable dust.

★ Hydraulic impact wrenches are available, either drill-mounted, feed-leg mounted, or hand-held types. All types derive their power from the machine—have ample torque to drive nuts to refusal.

★ SULMET Carbide Bits and Drill Steels designed for the RBD-1 Drill are available.

Consult a Joy Engineer

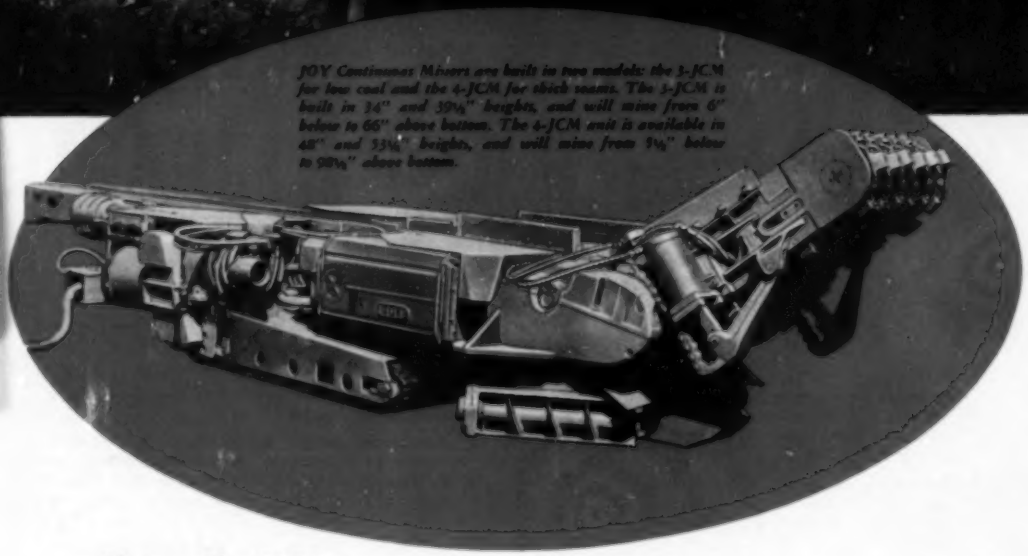
W & D CL 3412

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

NOW! More than 100



JOY Continuous Miners are built in two models: the 3-JCM for low coal and the 4-JCM for thick seams. The 3-JCM is built in 24" and 39½" heights, and will mine from 6" below to 66" above bottom. The 4-JCM unit is available in 48" and 53½" heights, and will mine from 9½" below to 98½" above bottom.

Above: The 100th

JOY CONTINUOUS MINER

in the plant and on the job

This 100*th* JOY Continuous Miner, a 3-JCM machine, was shipped in September, 1950 and went on the job a few weeks later, in November—the fourth Continuous Miner in that particular operation. With well over a hundred Miners now in service around the world, each additional machine furnishes added testimony that the JOY Continuous Miner is definitely a *field proved* unit—established by performance as the greatest single advance in coal mine mechanization today for safety and low-cost, high-tonnage production.

in Highly Successful Use!

JOY CONTINUOUS MINERS

are Cutting Costs and Increasing Tonnage in every coal-mining field from coast to coast in the U.S.-and in several foreign countries.

Let us work with you to secure the best advantage from modern mechanized mining practice in your operations.

Consult a Joy Engineer

CL 3475

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

JOY SULMET CARBIDE AUGER BITS

Save PLENTY in this mine!

JOY CD-26 Coal Drill, for trackless operations.

Sulmet Auger Bits are available in 1¼" to 3" dia. sizes... Finger bits for larger size holes as required.

PLACE AND CONDITIONS: A mine in Southern Illinois. About 2' of sulphurous coal at the bottom of the seam—extremely hard to drill or cut. A bad top requires them to move in and out of a panel fast.

FORMER METHOD: Since their drill could only put in 16 holes in the bony per shift, they had to bottom cut and then drill the softer, upper part of the seam.

PRESENT METHOD: With Sulmet Auger Bits, they can put in 260 holes per shift in the bony with the same drill. Therefore, they can now cut above the hard band and shoot the bottom up.

RESULTS:

FORMER METHOD		PRESENT METHOD	
Cutter chain life	*25,000 tons*	*Cutter chain life*	*75,000 tons*
Cutter bit cost	*$.08 to $.10/ton*	*Cutter bit cost*	*$.015 to $.02/ton*

This improvement is entirely due to the fact that Sulmet Bits permit high speed drilling in impurities without excessive auger bit cost.

W & O CL 3548

Consult a Joy Engineer

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

500,000 MINE CARS CAN'T BE WRONG:

TIMKEN® bearings cut the cost of hauling coal and ore!

IF you want to cut hauling costs you can find one proven answer in the mine cars—more than 500,000 strong—that are equipped with Timken® tapered roller bearings. Successful mine operators report that Timken bearings require less attention, reduce power requirements, cut the cost per ton hauled.

Because they are made from case-hardened Timken fine alloy steel, Timken bearings easily carry the heavy shock loads found in mine car service. The tough inner core of the rollers and races takes the smashing impacts while their hard, smooth surfaces reduce friction and wear to a minimum. Due to their true rolling motion, Timken bearings permit more cars per train to be hauled with no increase in power requirements.

Timken bearings provide maximum load carrying capacity due to the line of contact between rollers and races. Cars take curves easier because the tapered design of Timken bearings takes radial and thrust loads in any combination.

Mine operators get maximum life from the bearings due to the adjustable feature of the Timken bearing mounting. No need for the costly replacement of bearings and parts as a result of wear. If wear should occur, just tighten the nut and the Timken bearings are brought back to their original setting. This feature is found only in mine car wheels equipped with tapered roller bearings.

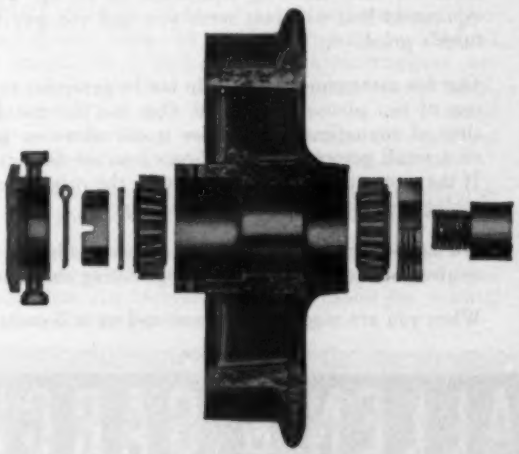
If rising costs are whittling your profit margin, investigate today the way Timken bearings can bring your hauling costs *down*. Write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

CUT YOUR COSTS BY SPECIFYING

TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◐ AND THRUST →◑← LOADS OR ANY COMBINATION →✳←

Cost and fee basis of operation . . . proved sound through 40 years

A&G co.

TOP OF THE FIELD

Every customer that we have served to date has approved our plan of compensation, which has been in effect since our origin. Proof of this full acceptance is indicated by the fact that 80% of our business has been repeat.

Our original cost estimate is made on the basis of current market prices for materials. If any, the variance in our original cost estimate has never been more than slight in either direction. When an adjustment is required, by prices rising or falling, you can easily check its validity.

Being strictly engineers and not manufacturers, we have no equipment for sale. Knowing equipment as we do, we recommend the equipment that will best serve you and you pay but the manufacturer's price.

Our fee arrangement can't help but be favorable to you. A choice of one of two plans is presented. One is a flat fee determined at the time of our estimate. The other is one where we go along with you on a small percentage basis, figured on the final cost of the project. If the costs are lower or higher than the original estimate, our percentage fee naturally varies accordingly.

We make every effort to give you all benefits in cost savings and work to give you the most modern in engineering and construction.

When you are ready, let us know and we will contact you.

Scope of Services

- Design and construction of new plants and their various units.
- Organization, operation and management of mines.
- Below ground modernization and mechanization.
- Reconstruction, revamping, or improvement of existing plants.
- General consulting work regarding power, equipment, operation, and various mining problems.
- Valuation for financing, fire loss, taxation purpose—reports and appraisals.

We work with undivided responsibility to you on a cost and fixed fee basis. We are not hampered by any connections which might prejudice the true professional engineering approach to your problems.

ALLEN & GARCIA COMPANY

CONSULTING AND CONSTRUCTING ENGINEERS

332 S. MICHIGAN AVE., CHICAGO 4, ILL. • 120 WALL ST., NEW YORK 5, N. Y.

TIREX CABLES...

PROTECT YOUR INVESTMENTS

Mining machines are big investments. They cost you many hard-earned dollars. Regardless of its make, mining machinery is only as good as the electric cable that powers it. If the cable fails, the machine is useless. When you choose your equipment be as sure of your cables as you are of your machines. Insist that they come equipped with TIREX.

Simplex-TIREX Portable Cables feature the qualities that assure trouble-free service under all operating conditions. They're flexible! They're tough! Their jackets of Selenium-Neoprene are especially compounded to provide protection against oils, acids, moisture and sunlight. They are cured in lead for long-lasting resistance to wear and tear. They will not support combustion. All TIREX Cables for underground service are marked P-101 BM.

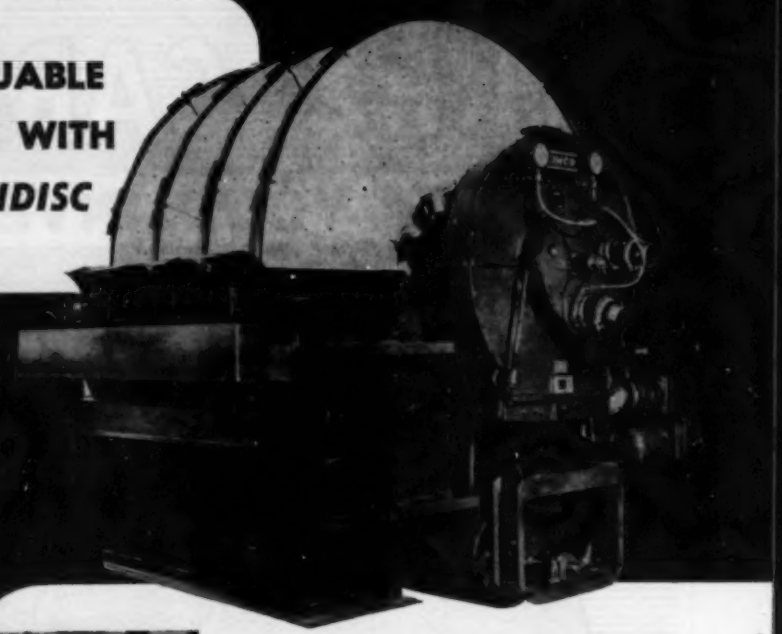
Consider these features. All add up to dependable performance and that's what you'll get from TIREX-equipped machines.

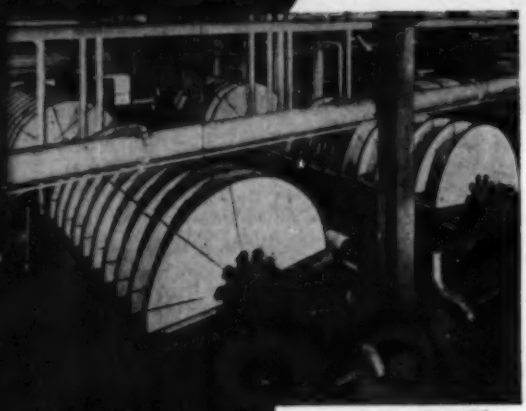
TIREX Cables are available in sizes and types to meet every requirement for use on shovels, cranes, cutters, loaders and locomotives. The TIREX line also includes cords and cables for welding machines, drills, pumps and motors.

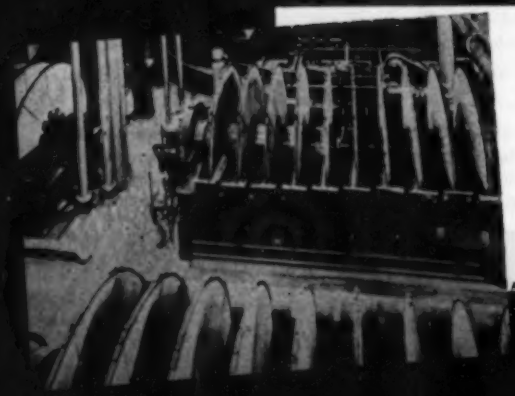
Simplex - WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET,
CAMBRIDGE 39, MASS.

SAVE VALUABLE COAL FINES WITH *EIMCO AGIDISC*







Modern coal washing plants are equipped with dewatering equipment to save coal fines and clarify the discharge water.

Older coal washing plants are finding that they can recover coal fines at a profit through the use of the same type of equipment.

Old and new plants using Eimco Agidisc filters have found that the salable coal fines recovered by this modern dewatering equipment is quickly paying for the expense of its installation.

Eimco Agidisc Filters are heavy-duty, high-capacity continuous vacuum filters designed to work on materials such as coal fines. These filters dry the cake rapidly and evenly and give a clean discharge. Maintenance is low and production is high.

Write for more information on Eimco Coal Saving Filters.

At Left: An Eimco installation in the world's largest heavy media separation coal washing plant.

A297

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES: SALT LAKE CITY 10, UTAH, U. S. A.

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KELLOGG, IDAHO, 201 DIVISION STREET

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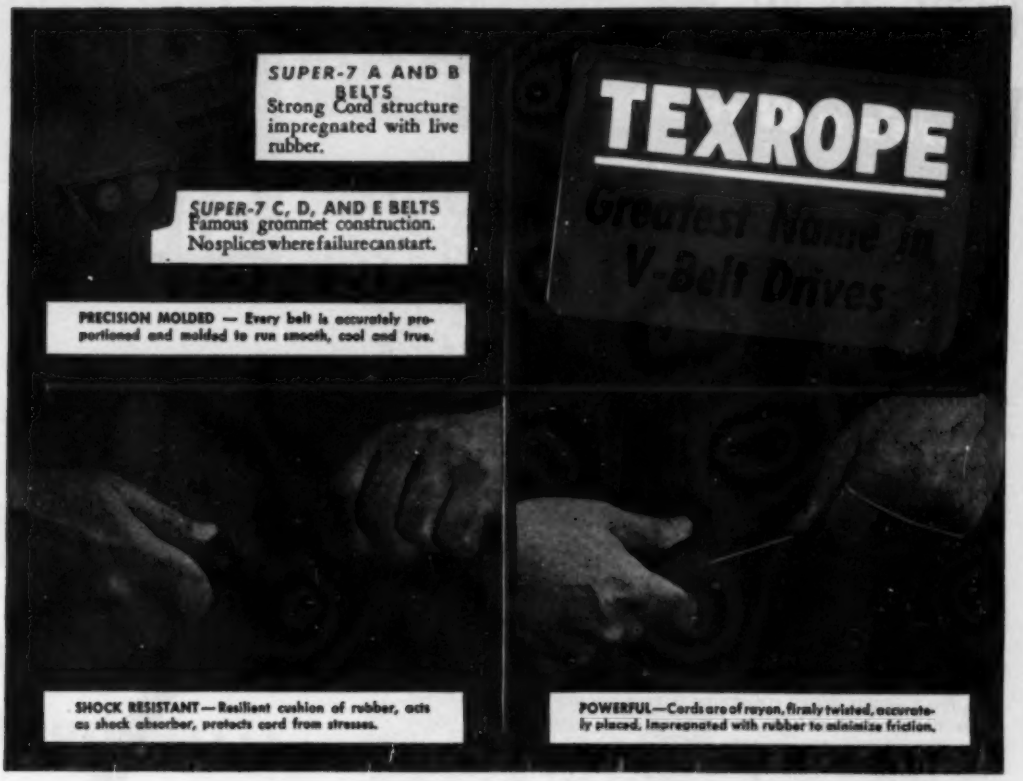
IN ENGLAND: EIMCO (GREAT BRITAIN), LTD., LEEDS 12, ENGLAND
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD


SUPER-7 A AND B BELTS
Strong Cord structure impregnated with live rubber.
SUPER-7 C, D, AND E BELTS
Famous grommet construction. No splices where failure can start.
PRECISION MOLDED — Every belt is accurately proportioned and molded to run smooth, cool and true.
TEXROPE
Greatest Name in V-Belt Drives
SHOCK RESISTANT—Resilient cushion of rubber, acts as shock absorber, protects cord from stresses.
POWERFUL—Cords are of rayon, firmly twisted, accurately placed, impregnated with rubber to minimize friction.

Cool Running... LONG LIVED!

SUPER-7 V-belts give long, satisfactory service even under bad conditions of load, shock and grit.

Tough, double-wrapped cover bias cut for elasticity and impregnated with rubber. Effectively seals out dust, grit, moisture; takes the wear; keeps the belt in shape; and protects cord structure.

But you get more than good belts when you standardize on *Super-7* V-belts. You also get the benefit of the greatest V-belt experience in the world both in the field and factory. You are assured of exactly the right drive for longest life from the wide variety of types and sizes available.

High Capacity Belts

Where space is limited or other special conditions demand heavier duty, the high capacity belt can be furnished in A, B, C, D, and E sections . . . Extra strong cords, special rubber cushion and tough Neoprene cover give them 40% greater capacity than standard belts at proportionately higher price.

V-Belt Drive Headquarters

Your nearby Allis-Chalmers Authorized Dealer or Sales Office can serve all your V-belt needs, whether they be new or replacement V-belts; standard and variable speed sheaves; or speed changers.

Get your copy of the revised 120 page *Texrope* Pre-Engineered Drive Manual from your A-C Dealer or Sales Office or write for Booklet 20B6956A. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3291

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ½ in. to 72 in. discharge and up.

Texrope and Super-7 are Allis-Chalmers trademarks.

ALLIS-CHALMERS

Here's a Wire Rope That LASTS

J&L STEEL

Mine Operators Get Longer Service Life with . . .

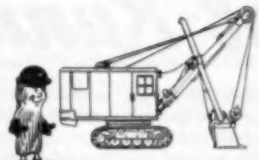
J&L CenterFit WIRE ROPE

If you're responsible for the wire rope on shovels, bulldozers or any other earthmoving equipment that operates on small diameter sheaves and drums, J&L CenterFit Wire Rope can help you save money.

CenterFit, produced exclusively by Jones & Laughlin Steel Corporation, has a unique design engineered to give you more steel and fewer voids than conventional wire rope. All strands run in the same direction with outside strands fitting snugly into the valleys between inside strands. The result—greater strength . . . easier handling . . . which means longer service life.

In addition J&L CenterFit is lubricated with BRONZ-LUBE the exclusive J&L lubricant with high film strength that prevents squeezing out between the strands. BRONZ-LUBE contains fine flakes of soft bearing metal that provide a smooth wear-resistant surface for every wire—forms a close adherent coating that doesn't drip off unless subjected to extremely high temperatures.

Users' records prove that J&L CenterFit lubricated with Bronz-lube reduces operating costs, diminishes downtime and increases profits when used in the applications for which it was designed.



AND HERE'S HOW YOU CAN FIND OUT MORE ABOUT CENTERFIT WIRE ROPE!

Just write to Jones & Laughlin Steel Corporation, 411 Jones & Laughlin Building, Pittsburgh 30, Pa., and ask for a free copy of our booklet, "CenterFit." It gives you detailed information on the construction and applications of this exclusive J&L wire rope and tells how others are saving money through its use.

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

What's YOUR problem?

H. Dillingham, lubrication specialist at Standard Oil's Evansville (Ind.) office, has helped this midwest mine solve vital operating and maintenance problems through his recommendations of lubricants. Within easy reach of the mine, he has given operators engineering service when they needed it.

There is a corps of such Standard Oil lubrication specialists throughout the Midwest. You'll find one located near your mine. Through special training and a lot of practical experience, this man has gained a working knowledge of lubrication that can mean real savings for you. You can obtain his services by contacting the nearest Standard Oil (Indiana) office. Discuss with him the savings you can make with such outstanding products as:

STANOIL Industrial Oils. Here's *one* line of oils that provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

SUPERLA Mine Lubricants. These new, improved oils and greases provide better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

CALUMET Viscous Lubricants. On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

Helps eccentrics keep their bearings . . .

SUPERLA
REG. U. S. PAT. OFF.
Greases

A large midwest coal mine has tested a number of products for the lubrication of screen eccentric bearings. None of these lubricants, however, has equaled the performance of a SUPERLA Grease recommended by a Standard Oil lubrication specialist. This SUPERLA Grease has successfully handled the job during 30 years of hard service. It has prevented bearing failures and minimized maintenance because of these lubricating qualities:

High load carrying ability. SUPERLA's strong lubricating film keeps wear at a minimum, protects bearings against shock loads.

Unique heat resistance. SUPERLA Greases remain stable at prolonged normal temperatures. Moreover, they provide safe lubrication during periods when operating temperatures are in excess of that which ordinary cup greases will withstand.

Stability to oxidation. Because of their highly stable composition, SUPERLA Greases resist changes produced by oxidation, retain their original condition longer than conventional products do in storage and in use.

These qualities of SUPERLA Greases will reduce bearing maintenance in your mine not only for screen eccentrics but for a great variety of tipple, shovel, and underground equipment.

Discuss the advantages of SUPERLA Greases with a Standard Oil lubrication specialist. His headquarters are near your mine. How you can benefit from his services is explained at the right.

Standard Oil Company (Ind.), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD

Only Carlon ... THE FIRST REAL PIPE THAT IS PLASTIC

Absolute resistance to rot, rust, and electrolytic corrosion gives durable, lightweight CARLON PLASTIC PIPE a service life many times longer than that of ordinary mine pipe. CARLON is unaffected by sulphurous waters, alkalies, metallic salts, and other corrosive wastes. In addition, its smooth internal surface will not accumulate scale.

Flexible and rigid types of CARLON are produced in all standard pipe sizes. Flexible pipe is furnished in long lengths which require fewer fittings per installation and will conform to irregular surface contours as well as slope or entry direction. Rigid CARLON is shipped in threaded and coupled random 21-foot lengths that can be joined rapidly by means of threaded plastic fittings. To meet individual job requirements, rigid pipe can be cut to desired length and threaded with standard pipe dies.

A complete line of molded plastic fittings incorporating standard I.P.T. is available for plastic-to-plastic or plastic-to-metal connections.

To eliminate costly maintenance and replacement programs, be sure to specify ONLY CARLON.

At present, raw material shortages are limiting the production of certain types of CARLON pipe. Every effort is being made, however, to overcome this problem and to meet the demand and need for CARLON . . . the first real pipe that is plastic.

CARLON CP 119-CP

CARLON PRODUCTS CORPORATION

IN CANADA: MICRO PLASTICS, LTD., ACTON, ONT.

10462 MEECH AVE. • CLEVELAND 5, OHIO

"CAT" BULLDOZER...

America's all-purpose tool!

This "Cat" D8 Tractor with No. 8A 'Dozer is building haul road in the Big Horn Coal Company's strip mine near Sheridan, Wyoming. The constantly shifting of coal face makes haul road construction highly important. The tool shown here does it all, with power to spare. . . . Price of a standard "Caterpillar" D8 Tractor is $15,000; No. 8A Bulldozer, $2,410; No. 25 Cable Control, $1,630, f.o.b. Peoria. Prices subject to change without notice.

"THE 'Caterpillar' angling 'dozer mounted on the D8 Tractor is tailor-made for building haul roads on steep spoil banks, and 80-ft.-high wall," says F. E. Lowell, official of the Big Horn Coal Co. operating near Sheridan, Wyoming. This all-purpose "Cat" Bulldozer not only works on haul road construction and maintenance, but is capable of stripping to the seam and making setups for shovel and dragline.

These machines give you matched design—tractor and 'dozer built to work together. This rugged team is a bear at meeting work schedules. Sturdy construction and quality materials enable it to keep punching full time without time out for tinkering, and the special steel cutting edge of the blade hammers through the toughest going. Most important of all, the precision methods used in "Caterpillar" factories build extra years of life into these highly maneuverable bulldozers.

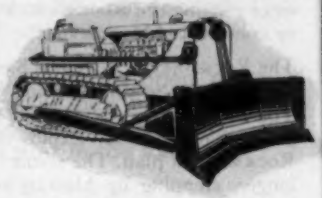
For help with your equipment problems, see your "Caterpillar" dealer *now*. Today's expanding military program has high priority. But it is recognized that our national preparedness depends upon stepped-up civilian production too. So your "Caterpillar" dealer is especially interested in meeting your needs—through equipment replacement and by exercising his working partnership with you to keep the machinery you have *on the job*.

CATERPILLAR, PEORIA, ILLINOIS

. . .

"CATERPILLAR" BULLDOZER EXTRA FEATURES

1. Tractor and 'dozer *broken to harness*, and a size for every need.
2. Moldboard curvature for active, *rolling*, higher production loads.
3. Box section side arms—extra thick at points of greatest stress.
4. Choice of straight or angling type of blade, simple to maneuver and easy to adjust or detach.
5. Your choice of hydraulic or cable controls.
6. The power of the "Caterpillar" Diesel Engine is geared to blade *capacity*.



New Addition to 'Dozer Line

Here's a specialist that can step up production and cut costs. It's the brand new No. 8U 'Dozer for use with the "Caterpillar" D8 Tractor, with cable control. Working best in loose or light material, the end portion of the blade extends forward, giving it a flat U shape. This enables the 'dozer to bulldoze longer distances without spillage for bigger production. The No. 8U is built to the same high standards of strength and long life as the other "Caterpillar" Bulldozers. The versatility of this new tool gives it excellent performance on all kinds of 'dozing jobs, from stockpiling to pioneering.

CATERPILLAR

REG. U.S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

Getting the MOST from your DRILLING ?

ROCKMASTER blasting pays you MORE PROFITS PER DRILL HOLE!

The ROCKMASTER blasting system changes a lot of thinking about drilling blast-holes, because it enables the explosives in each hole to do more work! Many blasters today are saving from 20% to 40% of their former drilling costs—and saving important money on dynamite, too—since putting the ROCKMASTER system into effect in their quarries, mines or construction operations.

The ROCKMASTER system is based on split-second time intervals between blast holes, the timing being controlled within the electric detonators. You have a choice of 16 time intervals, which we help you select to fit your requirements. Explosives are chosen and loaded to fit the ROCKMASTER plan. The result: Explosives gases work behind the burden longer, stepping up blasting efficiency and accomplishing far superior breakage, combined with almost unbelievable control of throw.

In terms of drilling, this usually means that drill holes can be spaced farther apart. Or, it might mean you can use less dynamite with your regular spacing. Drilling for secondary blasting is usually cut way down, frequently eliminated altogether.

Write for booklet showing typical ROCKMASTER loading patterns for various types of blasting work. Or, better yet, call in the Atlas representative and let him tell you frankly what ROCKMASTER blasting can do for you.

ROCKMASTER TIMINGS

Rockmaster No.	Avg. Time of Each Delay from Zero (milli-seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

ROCKMASTER: Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES *"Everything for Blasting"*

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

THE *Femco* 1 TO 10-SHOT FIRER

An AUTHENTIC ORIGINAL

Whether you're an art expert or coal expert, you'll recognize this truth: There's only **one authentic original,** topping all imitations as **the** foremost painting . . . or **the** foremost shot firer.

Such an original work of engineering is Femco's 1 to 10-Shot Firer . . . the first capacitor-operated shot firer developed specifically for coal miners everywhere.

Some years ago Femco pioneered the special circuit which enabled it to produce the first shot firer not dependent on speed of operation for effectiveness.

Now, whether in mine or open pit blasting, the critics, the men who mine, use the Femco, the lightest, surest and safest 1 to 10-shot firer in the long history of coal.

So for CONVENIENCE ➧ Weighs slightly over 1 lb. Can be carried and fired from belt. Insertion of Safety Key charges capacitors from battery; neon light gives "ready" signal, and charge is fired by removing Safety Key.

SAFETY ➧ Permissible 10-shot blasting unit U. S. Bureau of Mines Approval 1603. Cannot be fired accidentally since battery disconnects from capacitors which transfer charge to firing line. Battery cannot be sparked or otherwise short circuited.

and (B)lasting DEPENDABILITY ➧ When neon light glows you are ready to fire! Fires ten shots as easily as one.

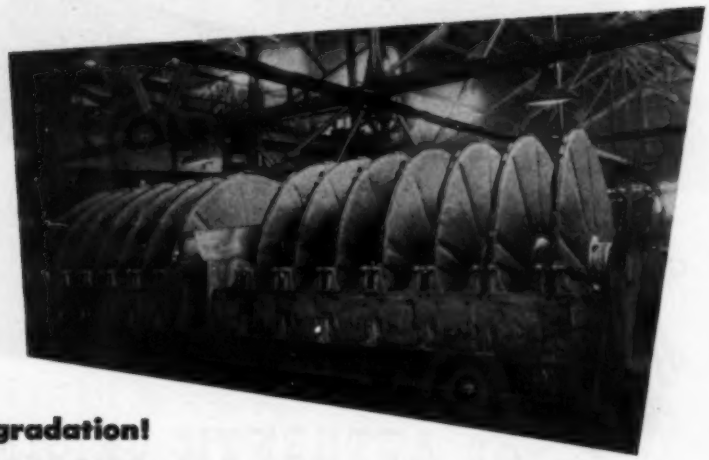
Use Femco's Authentic Original—the 1 to 10-Shot Firer!

FARMERS ENGINEERING AND MANUFACTURING CO.

549 BRUSHTON AVE. • PITTSBURGH 21, PA. • CHurchill 1-5050

Specialists in Electronic Communications

DEWATERING FINE COAL



. . . without Degradation!

. . . with Clean Filtrate!

DO IT the American way. A play on words? Yes, but nowhere can you find a more effective, higher capacity unit for dewatering fine coal than the American Continuous Filter.

Better yet, nowhere can you find a unit which, considering the stream pollution problem confronting coal companies, will do what a real dewaterer is supposed to do: separate solids from liquids without letting the solids through in damaging percentages. Filtrate from the American Filter handling fine coal (⅛" and under) carries on the average less than 1% solids.

And best of all — you will find that all this effective dewatering takes place *without any degradation of product.* The coal is handled gently.

Bring your fines dewatering problem to Oliver United. We have laboratory facilities and field test units for determining the best filter station. And we have several types of dewaterers to complement the American where sizes are such as to call for a different filter.

New York 18 — 33 W. 42nd St. Chicago 1 — 221 N. LaSalle St.
Oakland 1 — 2900 Glascock St. San Francisco 11 — 260 Calif. St.
Export Sales Office — New York • Cable — OLIUNIFILT

FACTORIES:
Hazleton, Pa.
Oakland, Calif.

OLIVER UNITED FILTERS INC.

WORLD WIDE SALES, SERVICE AND MANUFACTURING FACILITIES

CANADA
E. Long, Ltd.
Orillia, Ontario

MEXICO & CENT. AMERICA
Oliver United Filters Inc. •
Oakland, Calif.

EUROPE & NORTH AFRICA
Dorr-Oliver S. A. Brussels
Dorr-Oliver S.N.a.R.L. Paris
Dorr g.m.b.h. Wiesbaden (16)
Dorr-Oliver Co., Ltd., London, S.W. 1
Dorr-Oliver S.a.R.L. Milano
Dorr-Oliver, N.V. Amsterdam-C

PHILIPPINE ISLANDS
E. J. Nell Co.
Manila

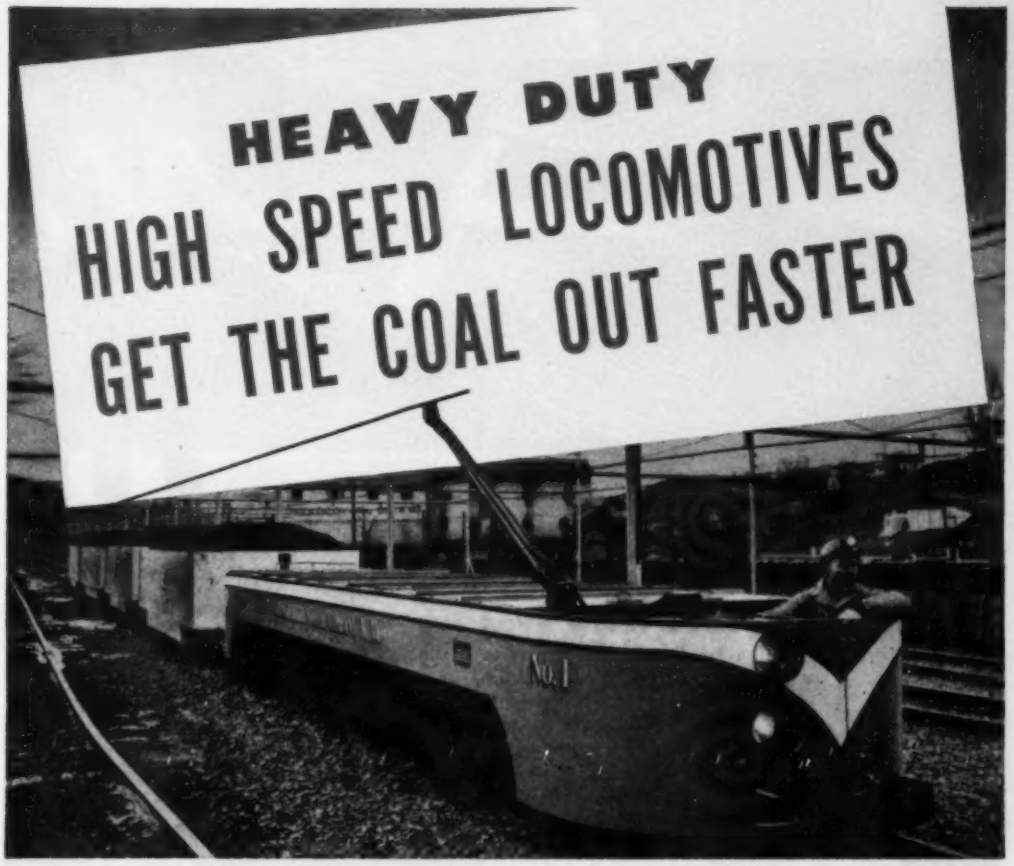
HAWAIIAN ISLANDS
Honolulu
A. R. Duvall

WEST INDIES
Wm. A. Powe — Havana

SOUTH AMERICA & ASIA
The Dorr Co., New York

AUSTRALIA
Hobart Duff Pty., Ltd.
Melbourne

SOUTH AFRICA
E. L. Bateman
Johannesburg, Transvaal



Mechanized mining requires powerful, fast moving mine haulage locomotives to increase mine output. Operating speeds of 12–15 mph and high continuous ratings with G-E mine locomotives will get the coal out faster, and slash operating expenses at the same time!

Rugged—but easy on the track

Tough, durable locomotives, they'll stay on the job day after day—with a minimum of maintenance. Equalized spring suspension lessens track wear. Balanced design enables 'em to hug the rails at top speeds. Smooth pickup permits operation close to the slipping point of the wheels, increasing the load that can be started.

Call your G-E representative. He will show you how G-E mine haulage locomotives fit readily into your mine mechanization program. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

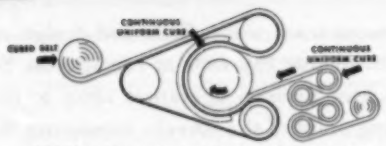
GENERAL ELECTRIC

OCS*

It's there even when you don't see it

...this Achilles Heel of Conventional Belts

ROTOCURE eliminates this common cause of Failure



SKETCH OF EXCLUSIVE ROTOCURE PROCESS

Although they often can't be detected with the naked eye, overcured segments or "Achilles' Heels" are present every 30 to 40 feet in belts cured by the flat press method. They occur because the vulcanization is *not* continuous due to overlapping. These press overlaps of 2" to 4" across the entire width of the belt get a double dose of curing. These segments make for costly operational weaknesses on the job and may result in early and complete failure of the belt.

* "Overcured Sections"— present every 30' to 40' in all belts made by the flat press method. *Only* Rotocuring eliminates this basic cause of belt failure.

BWH ROTOCURED belts are made differently — the *only* belts constructed by a continuous, endless curing process. Because press overlapping can't happen, overcuring is eliminated and flex life is improved by as much as 40%. Rotocure also eliminates mechanical distortion at the press ends . . . provides constant, uniform stretch . . . assures uniform abrasion resistant covers because one vulcanization and *only one* takes place. The end result is a better belt the first day you put it on . . . a more trouble-free belt day after day — a belt with MORE working days built into it! Ask your BWH distributor or write us direct.

Another Quality Product of

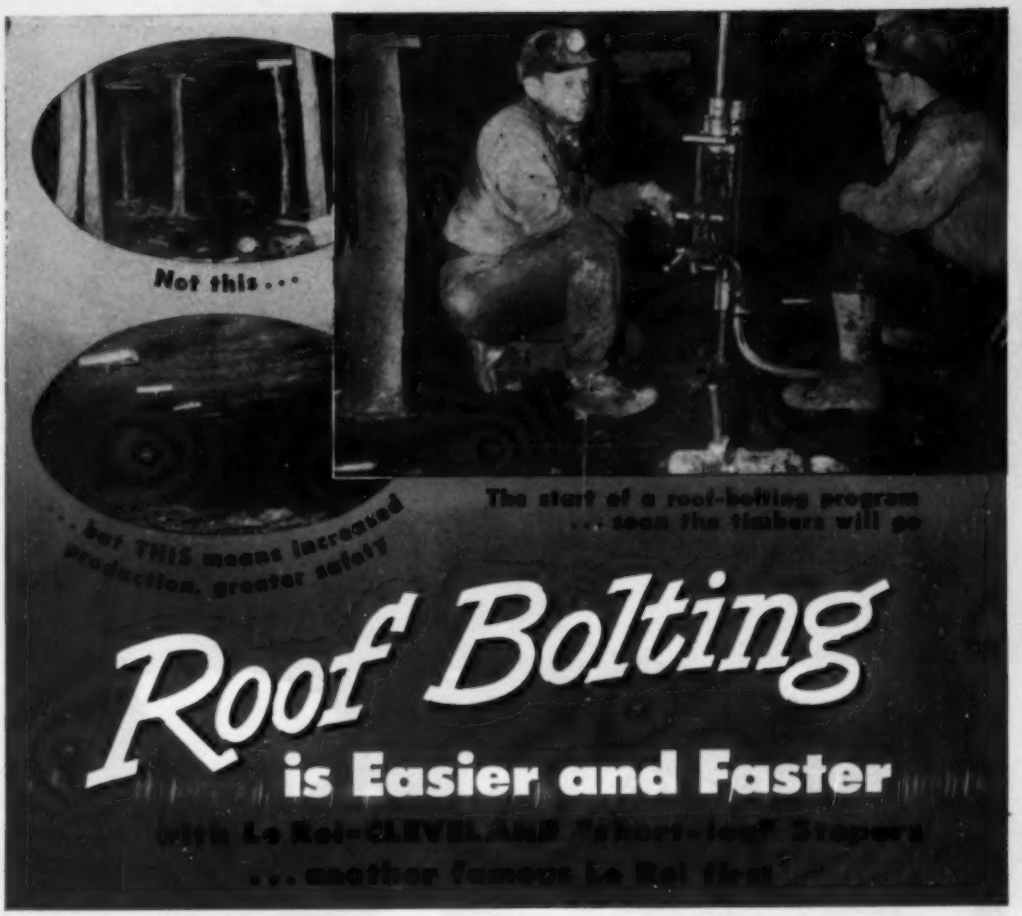
BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

BWH

DEPENDABLE RUGGEDNESS


Not this . . .
. . . but THIS means increased production, greater safety
The start of a roof-bolting program . . . soon the timbers will go

Roof Bolting is Easier and Faster

with Le Roi-CLEVELAND "short-leg" Stopers

. . . another famous Le Roi first

IN mine after mine, roof bolting helps increase production — raises tons per man-shift.

As the trend toward this new practice grows, more and more Le Roi-CLEVELAND "short-leg" stopers are going underground. For example, in one leading coal-mining area 91 out of 103 mines use Le Roi-CLEVELAND.

Here are a few reasons why these time- and money-saving machines can keep your roof-bolting cost down:

★ **A complete range of sizes** to meet every mining condition including low coal.

★ **Easy handling** and fast drillers.

★ **Trip rotation** — this is standard on all Le Roi-CLEVELAND machines so that you can use the same stoper for drilling and, by stopping the rotation, for driving roof bolts.

★ **Built to stay underground** — that's why you can depend on LeRoi-CLEVELAND stopers to save time and cut costs.

If you want more information on roof bolting just drop us a line. We pioneered and perfected not only the roof-bolting stoper, but also many of the techniques in use today.

LE ROI COMPANY

CLEVELAND ROCK DRILL DIVISION

12500 Berea Road, Cleveland 11, Ohio

Plants: Milwaukee, Cleveland and Greenwich, Ohio

Here is the Chain that is Making Mine History...

WHITNEY LOADER CHAIN

Ever since it was first introduced, Whitney Universal Joint Mine Chain has been making mine history. The reason . . . by reducing loader down time, cutting costs and simplifying maintenance.

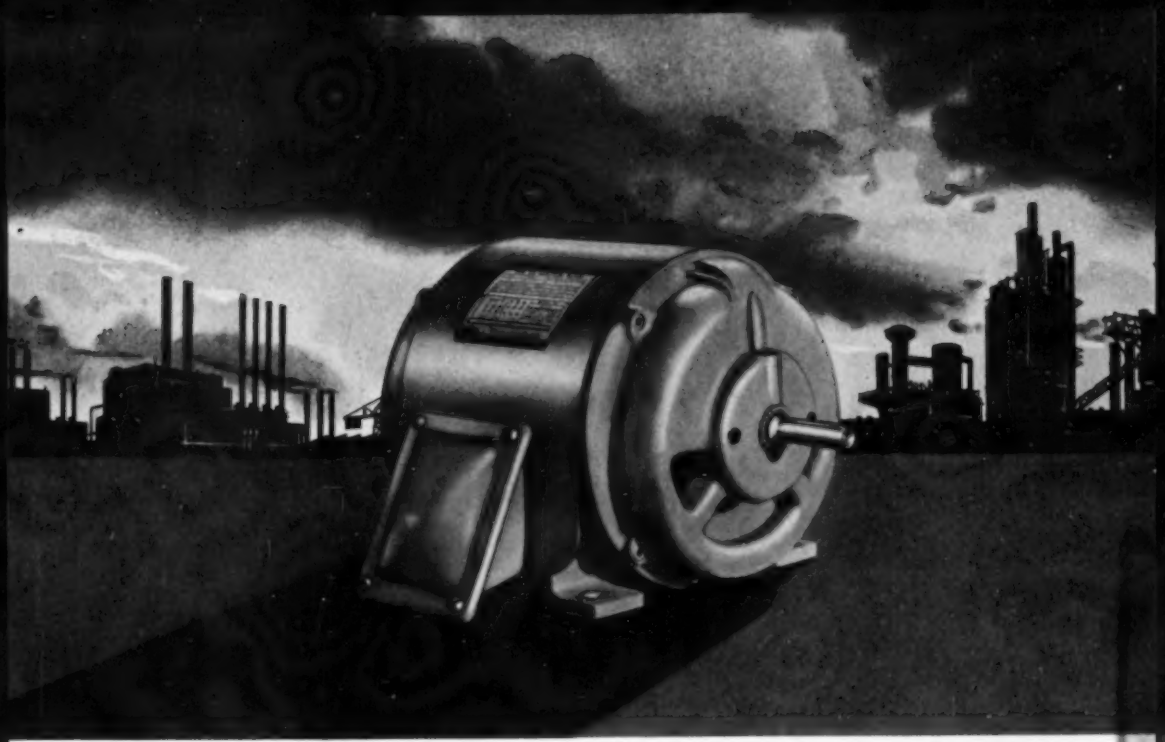
Whitney Universal Joint Mine Chain is *specifically* designed for loaders — from ruggedly designed flights to alloy steel chain parts, it is engineered to withstand the severest operating conditions in underground service.

But that's not all . . . Whitney Loader Chain further reduces operating costs because it permits on-the-job chain repairs. All you need is a wrench, hammer and a few sections of packaged chain and flight assemblies. There is no lost time taking the loader to the repair shop. It stays up-at-the-face getting out coal.

It will pay you to investigate Whitney Mine Chains today. Get in touch with your local Whitney Distributor. He will show you the many exclusive features which make this chain the solution to your drive problems. Or, write us for catalog and complete information on this Mine-Engineered Whitney Loader Chain!

WHITNEY CHAIN COMPANY
210 HAMILTON STREET, HARTFORD 2, CONN.

IT'S PACKAGED TOO! The chain sections and flight pitches are carefully packaged at the factory for protection. The tough, sealed box keeps out moisture, dirt and dust . . . assures proper prelubrication. All the elements required to assemble Universal Joint Mine Chains are contained in small, easy-to-handle cartons. Cartons conserve storage space — permit shelve stocking — provide accurate inventory control. Clearly labeled with prominently featured part numbers, permits easy, correct selection of chain.



Emphatically— all motors are NOT ALIKE!

Some time ago, Reliance startled many people by challenging the old chestnut . . . "all motors are pretty much alike". We have since offered proof that all motors are *not* alike by showing how PRECISION-BUILT A-c. Motors are made differently — to deliver dependable power longer. Reliance is always anxious to have interested visitors see our modern plants and the many extra precision steps which account for the big difference in these motors. But if it isn't practical for you to make such a visit, just call in a Reliance Sales Engineer and you will see pictures, charts and hard facts which are turning more and more motor users into Reliance customers.

Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

1055 IVANHOE ROAD • CLEVELAND 10, OHIO

CANADIAN DIVISION: WELLAND, ONTARIO

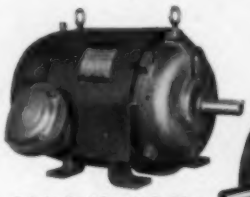
The BEST PRE-LUBRICATED BEARING DESIGN in Electric Motors!

The Reliance Pre-Lubricated Bearing Design has all of the features vital to maximum motor life. Its original factory bearing lubrication, for example, provides more operating hours before re-lubrication is necessary than of any other pre-lubricated bearing. Write for *new* Bulletin B-2201 featuring a convenient chart on which you yourself can check the 15 reasons why the Reliance Pre-Lubricated Bearing Design is the best in electric motors.

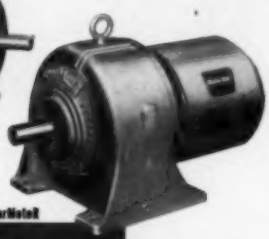
TOTALLY-ENCLOSED, FAN-COOLED A-C. MOTOR
(Inside construction shown in cutaway at lower left)

Protected Open

Splash-Proof



Explosion-Proof, Corrosion-Resisting

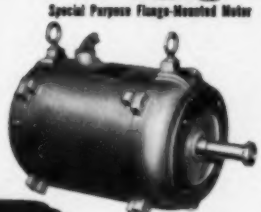


General Purpose GearMotor

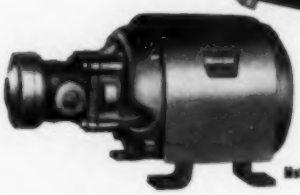
RELIANCE
Precision-Built A-c. Motors

Special Purpose Flange-Mounted Motor

Vertical Motor



"Built-In" Design



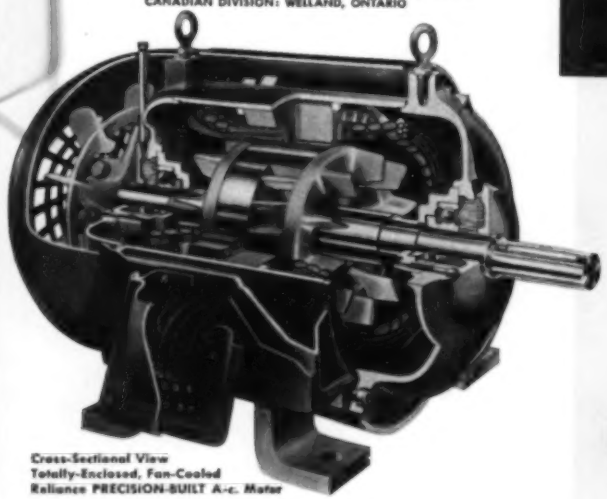
Motor with integrally Mounted Pump

Sales Representatives in Principal Cities

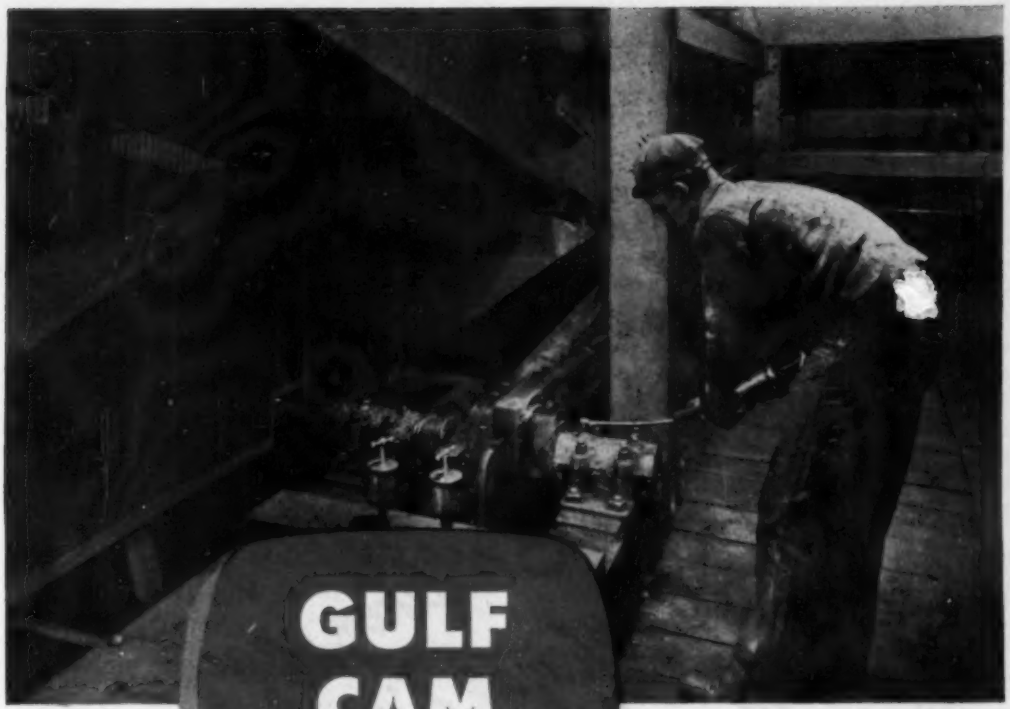
RELIANCE ELECTRIC AND ENGINEERING CO.

1055 IVANHOE ROAD • CLEVELAND 10, OHIO

CANADIAN DIVISION: WELLAND, ONTARIO



Cross-Sectional View
Totally-Enclosed, Fan-Cooled
Reliance PRECISION-BUILT A-c. Motor



GULF CAM GREASE solves costly coal mine lubrication problem

Because of constantly changing loads, high rubbing speeds, and the wet conditions under which shaker screen eccentric straps frequently operate, lubrication has often been difficult. Overheating, loss of lubricant, and excessive wear are typical of the problems encountered. To do the job a lubricant with special characteristics is called for. It must have the desirable characteristics of both grease and oil without the usual disadvantages of either.

Gulf Cam Grease, a recent development of Gulf Research, is the answer. It combines all the properties necessary to provide efficient lubrication for eccentric cams and bearings. It has a high dropping point—resists leakage from the bearings at high operating temperatures. And it doesn't separate or oxidize appreciably at these high temperatures.

Unlike most high temperature greases, Gulf Cam Grease has been specially treated so that it has excellent resistance to leaching by water. Its use helps eliminate lubrication troubles, and insures lower maintenance costs. Call in a Gulf Lubrication Engineer today. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh 30, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

Jim B.-
Heard you're about to order spikes. Suggest you buy from Bethlehem again. Last batch was fine. Good, sharp points.
Tracy
BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Other Bethlehem Fasteners for the Mine

TRACK BOLTS • RIVETS • THREADED RODS • NUTS • ROOF BOLTS AND ACCESSORIES

LONGER LIFTS. The high tensile strength of "Cordura" Rayon eliminates costly transfer points. For example, a belt reinforced with seven plies of "Cordura" can lift 1000 tons of overburden per hour up a 15° slope over 1000-foot centers. It has design tension of 900 pounds per inch of width.

POINTS TO CONSIDER BEFORE YOU BUY YOUR NEXT CONVEYOR BELT

Shown on this page are some of the reasons why more and more economy-minded operators are planning to have their next conveyor belt built on Du Pont Cordura® High Tenacity Rayon.

"Cordura" has so much extra strength over natural fibers previously used that it provides a thinner yet stronger belt . . . at no extra cost.

You may already know "Cordura" Rayon as the yarn that makes tougher truck tires, stronger high-pressure hose and longer-lasting V-belts. We'll be glad to send you the names of suppliers of conveyor belts improved with this industrial rayon.

You can also get full information about "Cordura" in the new manual, "Sinews for Industry." It gives physical properties of "Cordura" rayon, describes many successful applications and tells how "Cordura" improves the efficiency of conveyor systems. For your free copy, address Room 4527, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

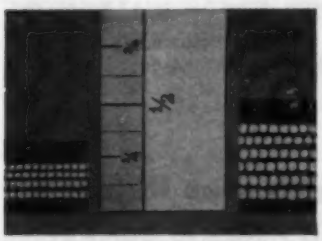
Reg. U. S. Pat. Off.

DU PONT "CORDURA" HIGH TENACITY RAYON

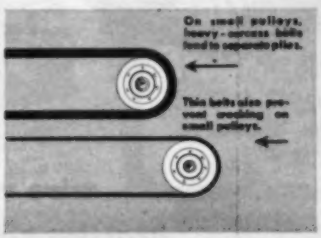
DU PONT

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

for RAYON . . . for NYLON . . . for fibers to come look to DU PONT



GREATER STRENGTH of belts built with "Cordura" is illustrated above. At left is cross-section of four-ply belt sinewed with "Cordura." It's stronger than conventional 6-ply belt at right, yet only half as thick. This thin, light belt is particularly desirable where panel equipment is moved frequently.



MORE FLEXIBLE. Belts built with "Cordura" have less tendency to crack and separate plies when run over small pulleys required in confined working space. And belts built with "Cordura" have less stretch, so less take-up room is needed. And they trough well under any loading conditions.

HEAVIER LOADING is possible on conveyor belts built with Du Pont "Cordura" High Tenacity Rayon. This yarn is inherently stronger than the natural fibers commonly used. It packs extra strength into conveyor belts and enables them to carry loads to the capacity of power equipment.

Rope leads from

UPSON-WALTON

Selecting the "lay" of wire rope

● An important characteristic of a wire rope is its *lay*—the relative directions in which wires in the strands, and strands in the rope are twisted.

In *regular lay* rope, the wires in the strands are twisted in the opposite direction to the strands in the rope.

However *lang lay* rope—in which wires and strands are twisted in the same direction—offers several advantages:

- it flexes better
- it has more resistance to abrasion
- it has more resistance to bending fatigue

When choosing *lang lay,* be sure to specify that it be "preformed". An extra operation in the manufacture of Upson-Walton's LAYRITE preformed rope forms the wires and strands in a fixed spiral. This frees each part from internal stress. Years of rugged service have shown that Upson-Walton's LAYRITE wears longer, cuts maintenance costs.

Specify it on your next tough job.

THE UPSON-WALTON CO.
CLEVELAND, OHIO
NEW YORK • CHICAGO • PITTSBURGH

wire rope • rope fittings
brattice cloth • tackle blocks

MATCH YOUR WIRE ROPE TO YOUR FITTINGS AND BLOCKS . . . ONLY UPSON WALTON OFFERS ALL THREE

CUT MINING COSTS !!!

BLAST HOLE AND COAL RECOVERY DRILLS

● McCarthy Self-Propelled Horizontal Blast Hole Drills get in and out of tight quarters quickly; adjusts on four individual leveling jacks for proper drilling heights. Excellent for low level work.

● Truck Mounted Horizontal McCarthy Drills are breaking drilling records everywhere! All necessary equipment is carried with the unit — out of the mud at working level!

● Here's a Vertical McCarthy Unit on a Half-Track. Compact construction makes McCarthy Drills perfect for all mountings . . . truck, half-track, cat, jumbo or other special rigs.

Heavy

Rugged

Powerful

McCARTHY DRILLS

● If you haven't already seen a McCarthy at work, we suggest you see one quick!

These rugged, powerful units have gained universal acceptance as the most efficient machines ever made for drilling blast holes. Furnished with gasoline, electric or diesel power.

Extra heavy construction relieves you of maintenance troubles. They're versatile, fast, economical machines capable of 50% more productive service than any drill you might now be using!

Write Salem Tool today for full facts. Also ask about McCarthy Coal Recovery Drills — the machine that's being acclaimed in so many trade journals for its remarkable ability to reduce mining costs.

DRILLING EQUIPMENT SINCE 1901

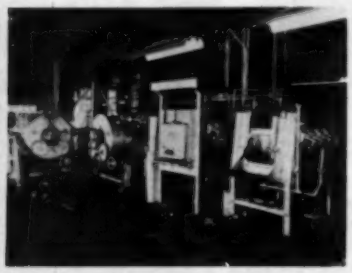
●

SALEM

THE SALEM TOOL CO.

BACKSTAGE at BOWDIL...

...a glimpse behind the scenes to show you *WHY* Bowdil Products enjoy a reputation as the standard of the coal mining industry.



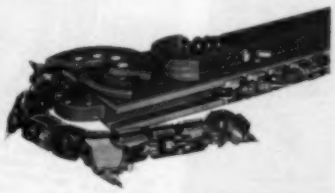
Latest type tempering, tool-hardening and carburizing furnaces give Bowdil products the right hardness, tensile strength and toughness. Every Bowdil Bit receives the most up-to-date heat treatment . . . for example, natural gas from our mains is first purified by a special generator, and another maintains constantly uniform temperature of quenching oil.

product performance depends on proper heat treating

This new grinder, mounted on a floating base in our plant, assures accuracy to .0001" on the parts of Bowdil Chain that take the greatest abuse. Such attention to precision means longer life, trouble free service—results directly in power savings and less down-time for your operation.

our investment in precision pays you dividends

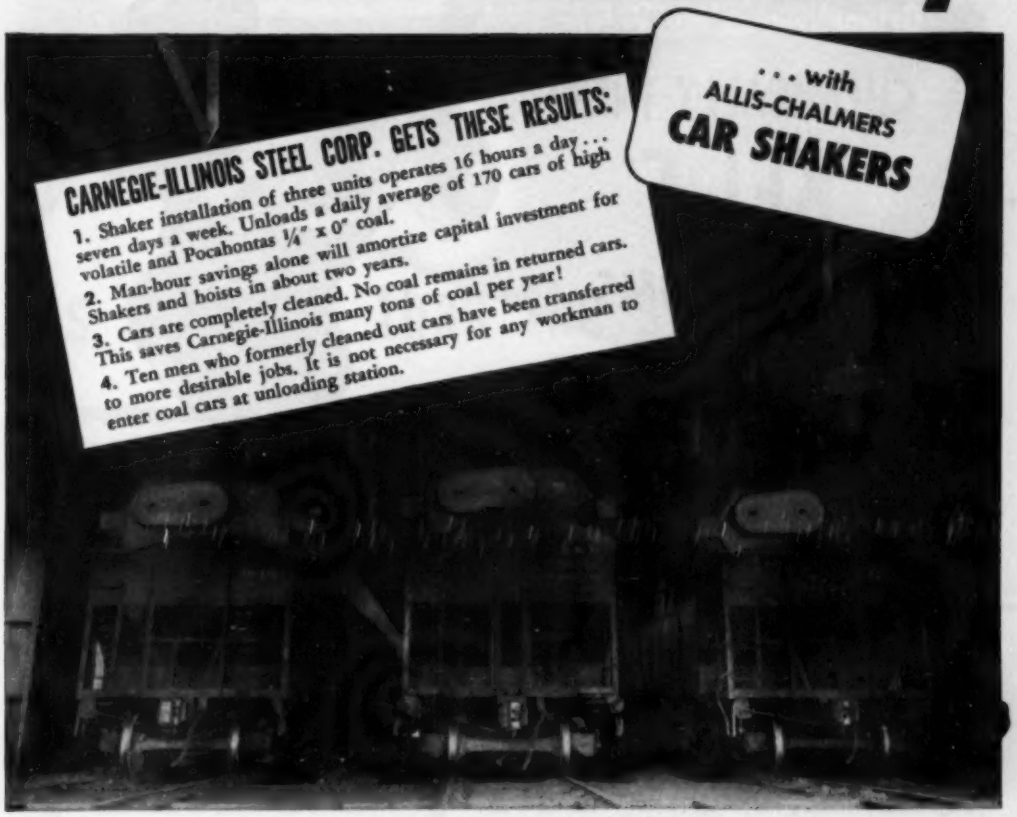
All-welded construction of Bowdil Bars has proved them superior in actual tests made by exerting measured pressure between 3 foot centers . . 4" thick conventional bars tested will bend with 25 to 35 tons pressure—3" thick Bowdil Bars will bend with 60 to 70 tons pressure.



modern welding is your assurance of product strength and durability

The BOWDIL CO. CANTON, OHIO

STEEL MILL UNLOADS 170 Coal Cars Daily!


CARNEGIE-ILLINOIS STEEL CORP. GETS THESE RESULTS:
1. Shaker installation of three units operates 16 hours a day . . . seven days a week. Unloads a daily average of 170 cars of high volatile and Pocahontas ¼" x 0" coal.
2. Man-hour savings alone will amortize capital investment for Shakers and hoists in about two years.
3. Cars are completely cleaned. No coal remains in returned cars. This saves Carnegie-Illinois many tons of coal per year!
4. Ten men who formerly cleaned out cars have been transferred to more desirable jobs. It is not necessary for any workman to enter coal cars at unloading station.
. . . with ALLIS-CHALMERS CAR SHAKERS

YOU CAN GET SIMILAR SAVINGS in demurrage charges and man-hours by installing an Allis-Chalmers Car Shaker. And you save with safety! Accidents are eliminated as workmen do not have to mount the car during the automatic unloading operation.

The Shaker is driven by a 15 hp, high torque, integrally enclosed Allis-Chalmers motor — mounted on rubber to protect motor from severe vibration.

For complete information on how the Car Shaker can help *you* save time and money, contact your nearby A-C Sales Office. Or write for Bulletin 07B7221.

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PROVED IN PERFORMANCE

Grinnell-Saunders Valves with CHEMICALLY INERT KEL-F* DIAPHRAGMS

Pat. Appl. For

Grinnell-Saunders Diaphragm Valves with KEL-F Diaphragms are living up to every promise made for them! At the right are reports from typical users.

KEL-F's resistance to chemical action, low cold flow, wide range of temperature application and exceptional flex life combine to make it the most important diaphragm development in years. KEL-F is chemically inert to all organic acids and alkalies in all concentrations. It withstands chlorinated aliphatic and aromatic compounds, concentrated nitric, chromic, hydrofluoric and sulphuric acids and most solvents which readily attack rubber and previous synthetic diaphragm materials.

While KEL-F is tough and flexible, it is not resilient. To provide resiliency for proper closure of the valve and to provide added support for the KEL-F diaphragm, it is backed with a rubber cushion. A free-floating method of attachment to the compressor assures an even closing pressure on the entire surface of the weir. A tube nut which floats as the rubber cushion presses down in closing the valve, eliminates excessive pressure on the diaphragm stud. The rubber cushions the closing force, thereby reducing wear and cutting action on the diaphragm. In accelerated tests, a 2-inch valve with a KEL-F diaphragm withstood over 80,000 closures, drop tight, against 80 pounds of air under water with no leakage and no visible signs of wear. Write for complete information.

Typical performance reports . . .

1. Chlorine and HCl gas with small amounts of acetic acid and acetyl chloride at 302° F. for 900 hours. Very much superior to material it replaced.
2. Mixed aromatic and ketone solvents at 230° F. and 10 psi for three months. No sign of deterioration.
3. Chlorinated organic chemical at 158 to 194° F. and 30 to 40 psi for nine months. No failure, no shutdown, no replacement.
4. Chromyl chloride at ambient temperature and 15 psi. Diaphragm condition good at end of thirty days' test.
5. Liquid chloral saturated with HCl at 158° F. for 408 hours. Well satisfied — have placed orders for additional diaphragms.

*"KEL-F" is the registered trade name for polytrifluorochlorethylene, an exceptionally stable thermoplastic. It is produced by the M. W. Kellogg Co.

GRINNELL

WHENEVER PIPING IS INVOLVED

GRINNELL COMPANY, INC., Providence, R. I. Warehouses: Atlanta • Billings • Buffalo • Charlotte • Chicago Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach • Los Angeles • Milwaukee • Minneapolis • New York Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

Each Tigerweld joint

is stronger than the strand itself!

These TIGERWELD Rail Bonds are electrically butt-welded and factory-tested.

Only butt-welding will guarantee that each and every strand is permanently connected to the solid end-piece. No other method will develop the full strength of the strand on a tensile test to destruction. *The butt-weld is even stronger than the strand itself.*

With construction like this, you can be sure of low resistance joints that give you decades of service despite continual vibration. The strand won't pull out, loosen or corrode at the joint.

Rely on TIGERWELD Bonds. Many millions are now in service.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

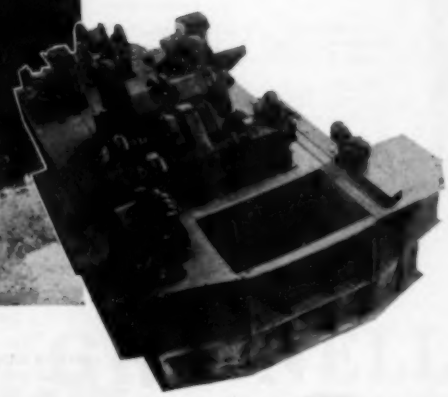
USS

American Tigerweld Rail Bonds

UNITED STATES STEEL

Loads 30 tons a minute —electrically!

1 With a 17-yard dipper and an 85-foot boom length, this new loader needs only five passes, averaging 35 seconds each, to load a standard 75-ton coal cart Thanks to G-E amplidyne control of hoist, swing, and crowd motions, the operator gets instant-acting response from the huge shovel, plus fast acceleration and deceleration that cuts cycle time to a minimum. With main drive completely G-E equipped, this world's largest coal loader contains motors totalling some 2000 horsepower.



AMPLIDYNE-CONTROLLED

SHOVEL DRIVES

. . . to cut mining costs!

2 Muscle power for the loader—shown in this view of machinery deck during assembly—includes two 187½-hp hoist motors (foreground), two 75-hp vertical swing motors, and a 75-hp crowd motor (background). G-E MD series motors—the toughest G-E shovel motors ever built—permit handling heavier loads safely at higher maximum speeds, provide more hp per frame size, require less inspection and maintenance.

3 This mammoth strip shovel—the loader's teammate and also electrically equipped throughout by General Electric—can pick up a load of overburden with its 20-yard dipper and drop it 300 feet away! In addition to amplidyne control of all motions, it utilizes a G-E amplidyne power-factor regulator that substantially reduces voltage variation, permits more efficient operation of the equipment.

World's largest loading shovel—together with giant stripper—relies on G-E equipment to help maintain average output of 100 tons of coal per man per day at Foley Bros. Inc. operation near Colstrip, Montana!

4 Hoist, swing, and crowd motors in the stripper are precisely governed by its G-E amplidyne control, shown mounted atop G-E motor-control cabinet inside the shovel house, with G-E switchgear at left. Small and compact, it uses fewer control devices, takes up minimum space, protects equipment against excessive current and torque peaks.

5 Incoming a-c power, protected against outages by neutral grounding, is converted to d-c by this 7-unit motor-generator set. Neutral grounding assures maximum protection for operating personnel and minimum equipment shut-downs in case of any line-to-ground fault. On large shovels of this type, designed to pay off by continuity of operation and high output, this is an especially important factor.

6 These two G-E 250-hp hoist motors, as well as the stripper's other motors, are of extra-tough construction for extra-heavy duty. They feature removable top portion for easy inspection and maintenance—right on the shovel—without disturbing motor alignment. Removal of external connections and four bolts provides easy access to armature and brush holders.

7 Like the stripper's hoist and crowd motors this G-E 125-hp vertical swing motor, one of two, is built for extra-tough jobs. Literally thousands of shovels and draglines have been electrified by G. E. to boost output, cut costs. This experience is at your service when you call in a G-E mining specialist, or specify G-E shovel equipment. Send for Bulletin GEA-4843, "More Yards Per Day." *Apparatus Department, General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

665-11

SOUND TONNAGE TALK

It's How Many Tons You Load CONSISTENTLY That Counts!

When we talk about loader capacity we try to be realistic and look at it from the coal mine operator's side of the desk. We don't believe the average operator gives a "toot" about rated capacities. All he wants to know is "How much coal will it load consistently?"

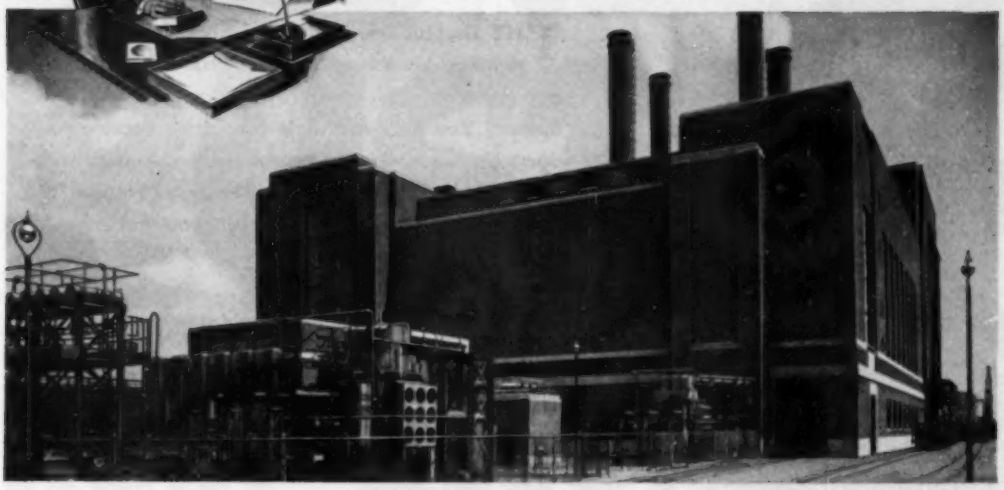
With the "Automat" three tons per minute is the average tonnage, but most important, it does it consistently, day-in, day-out with seldom a breakdown.

The "Automat" is the only loader available with that natural, smooth running, automatic shovel head. It goes under the coal, lifts and delivers it to conveyor at almost one stroke per second as illustrated. The loading head is the "business end" of any loader. All other loading functions of a machine, regardless of their individual efficiency, depend upon that loading head for their effectiveness. It's this loading head you are most interested in for production—don't overlook it. Since its inception—over 40 years ago as the first commercially successful mechanical loader—this shoveling principle of loading has been brought to its highest point of efficiency, the proved results of which have made the Whaley "Automat" so much in demand today for maximum production at the lowest cost per ton of material handled. Myers-Whaley Company, Knoxville, Tennessee.

MYERS—WHALEY

"Mechanical Loaders Exclusively For Over 41 Years"

"My bet's on Bituminous-



—the kind that is mined on the B&O!"

Take a tip from executives who think in terms of fuel economy and dependability of supply. These men design their plants for the efficient coals mined in B&O territory.

These coals, available in wide variety for all needs, lend themselves to mechanized, low-cost mining. As they are located close to America's industrial heart, transportation costs are moderate. And because their sources are *known* and *definite*, they can be depended upon —*even during wartime*—for centuries to come.

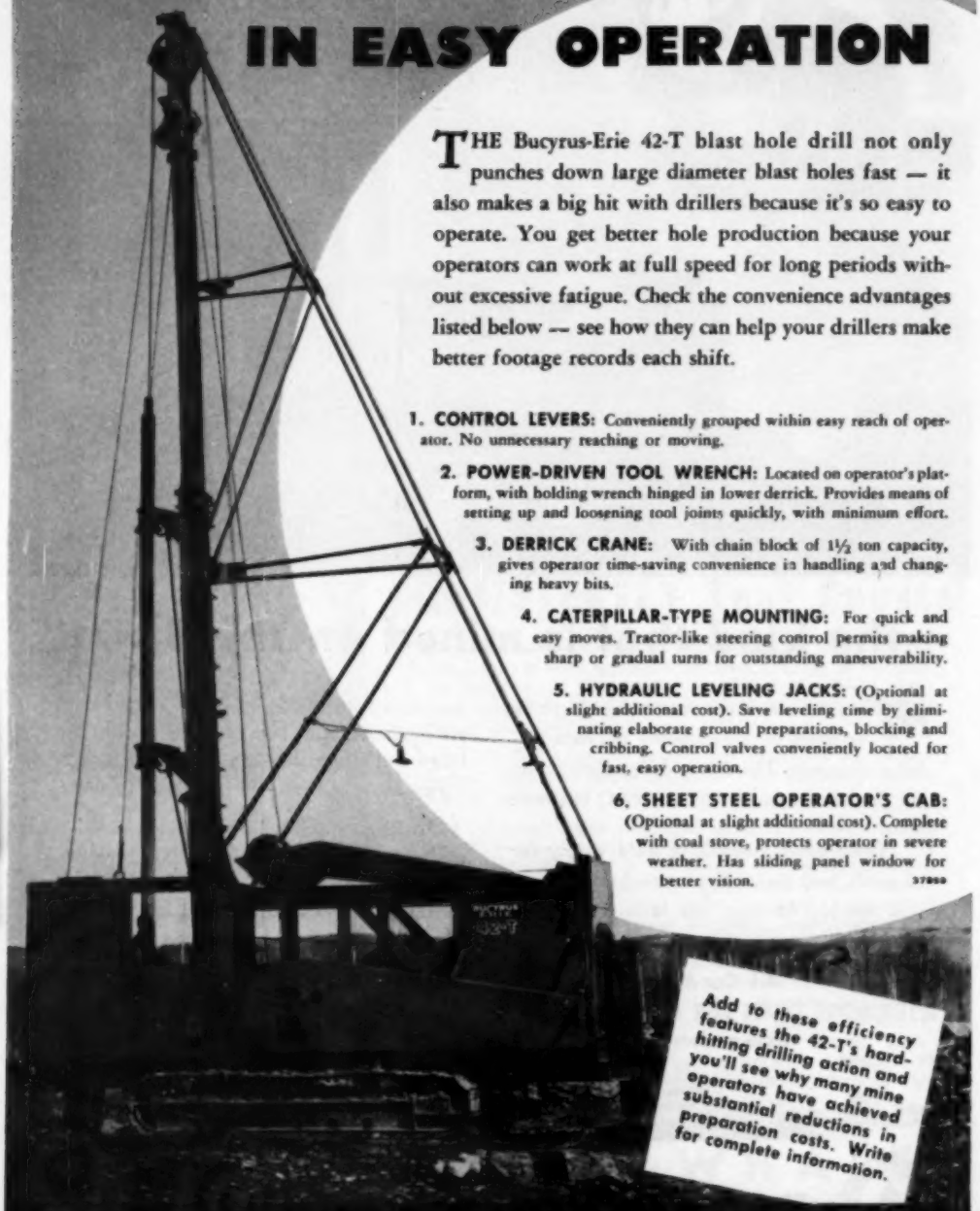
Backing its faith in Bituminous, the B&O has made large capital investments in its properties. The result will be even more efficient service for the Bituminous industry and its customers.

Ask Our Man!
BITUMINOUS COALS FOR EVERY PURPOSE
from modern mines like this—→

BALTIMORE & OHIO RAILROAD

Constantly *doing things* —better!

THERE'S *Increased Footage* IN EASY OPERATION



THE Bucyrus-Erie 42-T blast hole drill not only punches down large diameter blast holes fast — it also makes a big hit with drillers because it's so easy to operate. You get better hole production because your operators can work at full speed for long periods without excessive fatigue. Check the convenience advantages listed below — see how they can help your drillers make better footage records each shift.

1. **CONTROL LEVERS:** Conveniently grouped within easy reach of operator. No unnecessary reaching or moving.

2. **POWER-DRIVEN TOOL WRENCH:** Located on operator's platform, with holding wrench hinged in lower derrick. Provides means of setting up and loosening tool joints quickly, with minimum effort.

3. **DERRICK CRANE:** With chain block of 1½ ton capacity, gives operator time-saving convenience in handling and changing heavy bits.

4. **CATERPILLAR-TYPE MOUNTING:** For quick and easy moves. Tractor-like steering control permits making sharp or gradual turns for outstanding maneuverability.

5. **HYDRAULIC LEVELING JACKS:** (Optional at slight additional cost). Save leveling time by eliminating elaborate ground preparations, blocking and cribbing. Control valves conveniently located for fast, easy operation.

6. **SHEET STEEL OPERATOR'S CAB:** (Optional at slight additional cost). Complete with coal stove, protects operator in severe weather. Has sliding panel window for better vision.

57850

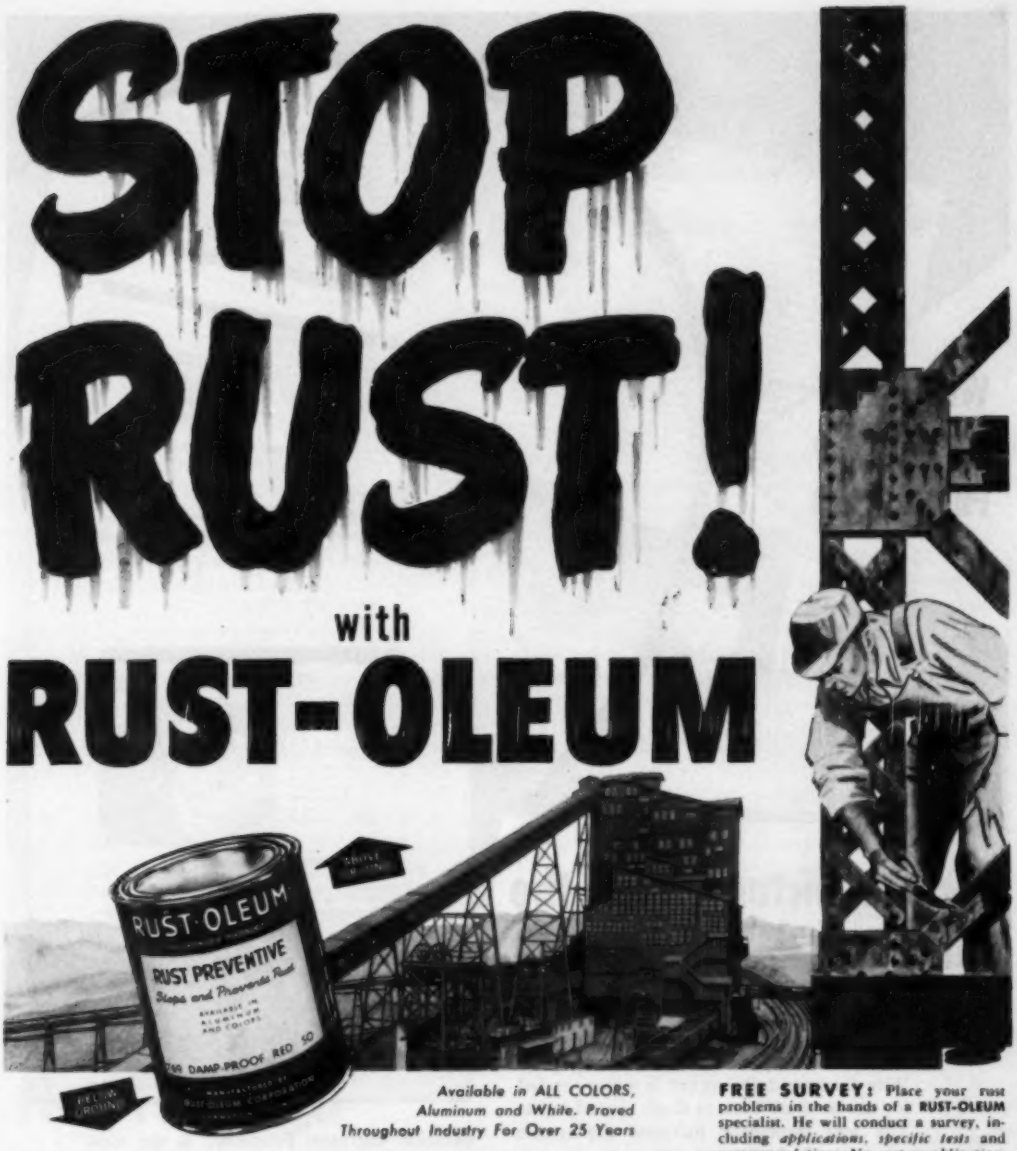
Add to these efficiency features the 42-T's hard-hitting drilling action and you'll see why many mine operators have achieved substantial reductions in preparation costs. Write for complete information.

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

STOP RUST!

with

RUST-OLEUM



Available in ALL COLORS, Aluminum and White. Proved Throughout Industry For Over 25 Years

Deep underground pipes, coal cars, machinery — tipples and surface equipment — all *rustable* metal surfaces need **RUST-OLEUM!** The *exclusive* formula that resists fumes, moisture, weathering, most acids and chemicals! Goes on easily by brush, dip or spray . . . dries to a firm, airtight, *decorative* finish!

May be applied over surfaces *already rusted* without removing all the rust. Specify **RUST-OLEUM** to your painting contractor or maintenance department for new construction, maintenance or remodeling. Prompt delivery from Industrial Distributor stocks in principal cities. Write for *complete* literature — *today!*

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is in the picture when the going gets *Rough*

Armored to resist highly abrasive conditions, Wire Countered Primacord is recommended for use as *down* lines in deep, ragged holes. The wire countering increases the tensile strength of the Primacord, and gives it added protection during loading operations.

The four grades of Primacord enable the blaster to meet every condition encountered in coal stripping, open-pit mining, quarrying, pipe-line river crossing, marine work, coyote tunnels, etc. Flexible, easy to hook up and handle, waterproof and insensitive to stray electrical currents, Primacord is the ideal detonating agent — the modern way to better output, greater economy.

Ask for a copy of the new Primacord Book.

THE ENSIGN-BICKFORD COMPANY

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Also Ensign-Bickford Safety Fuse — Since 1836

PRIMACORD-BICKFORD Detonating • Fuse •

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

MARCH, 1951 IVAN A. GIVEN, EDITOR

Still No. 1

COAL, along with other members of the national economy, is now getting its first experience with "gray mobilization." In many ways, this gray mobilization may prove to be a more-difficult period than even all-out war effort. First, there is no termination date, contrasted to the assumption in conducting all-out war that an end will be reached in a relatively short time. Gray mobilization, in the opinion of many authorities, may go on for years, subtracting manpower, materials and money from normal civilian applications and bringing in its train controls and regimentation heretofore never invoked in the absence of full-scale war.

In short, since there presently is not enough manpower, materials and money to support both the normal civilian economy and a defense establishment of the size required for adequate protection, the choice is between adequate preparedness and a lower living standard. Even World War II did not affect the living standard as much as gray mobilization apparently will, and, in World War II, people were willing to accept dollars in place of goods with the expectation that they could cash in later. But, inflation following the end of hostilities cost the dollar much of its position and consequently much of its power to stimulate production, even though money—through increased profits, longer hours, overtime and higher wage rates—will still be used for that purpose as far as possible. However, because the dollar has lost ground, pay-as-you-go becomes essential, though it brings with it the hazard that constant jacking-up of taxes eventually will destroy money's value as a production incentive.

Since the military machine of today leans heavily on equipment and materials, as well as on men, it is difficult to go to even moderate preparedness without controls for apportioning materials and manpower between the military and civilian establishments. But more production more efficiently achieved can do much to reduce the severity of the shock to the economy. And when real peace is attained, the higher-capacity production machine, experience has shown, can be used to build an even-higher living standard. Thus, to coal men, as to all others, the goal still remains high efficiency in production.

Not Too High

NO STRIKES and another period of peaceful production are the solid benefits of the last bituminous and anthracite wage agreements. Against this must be set the difficulties arising from further price increases necessitated by the wage boosts in these new contracts. There is no denying that the increases are an added burden, but in view of the losses incurred in past contract wrangles, such as that of 1949-50 in bituminous, the price for another opportunity to stabilize the industry and move ahead on the efficiency front does not seem too high for the industry to pay.

The settlement for 1951, particularly in bituminous, also reflects progress in improving coal's bargaining position and its bargaining machinery. Without the organization that preceded 1951, there is good cause to believe that past struggles might have been repeated, with attendant disruption of production and marketing and consequent losses of income and competitive strength. There is every reason to conclude that coal's new bargaining set-up had much to do with the peaceful settlement and that the effort should be to strengthen it.

From Now On, It Will Be Harder to Do Business, But . . .

You Can Get Along With Controls

How You Can Get Machinery and Equipment
What to Do About Pricing Your Coal
Who Can Help You in Washington
How You Can Protect Your Key Workers

THE NATION IS MOVING FAST toward a preparedness footing. That will take lots of men and material. Already, some coal operators are feeling the pinch as "gray mobilization" drains off steel and electric motors into defense pipelines and men into the armed services.

In doing its share for defense in the months ahead, coal will collect a hatful of problems. The problems will change from day to day, and so will the answers. It has to be that way in defense plans.

You can look to COAL AGE to help you find the answers as new problems arise and to keep you posted on the latest word from Washington. As a starter, the following pages include questions readers have asked in the last few weeks, together with answers as of Feb. 10. If you have a question we haven't answered, tell us about it and we'll try to run down the answer.

Where's the country headed?

We're not headed into full mobilization. That would mean 13 to 15 million men under arms, upwards of 100,000 planes a year (to mention only one item) and a cost of well over $150 billion a year.

We are approaching "gray mobilization." That means about 3.5 million men under arms by midyear. Though it means a speed-up in production of military "hardware," the emphasis will be on readiness to produce rather than on actual production. The aim is two-fold: (1) to tool up and enlarge capacity for future needs, and (2) to warehouse enough goods to fight for a year. By the end of the first year of a war, production would reach the all-out level.

The bill for gray mobilization in fiscal 1951-52 will be $41.4 billion, plus $1.3 billion for stockpiling and $7.4 billion for aid to our allies. By midyear, defense will take about 18% of gross national product, against 7% in the last half of 1950.

That sounds like tough times ahead. Where will I have most trouble?

The biggest headaches will be scarce materials, high prices and tight manpower.

What's the government doing about equipment and materials?

After some fumbling starts, the President at last set up the Office of Defense Mobilization in December. He gave C. E. Wilson, ODM chief, powers second only to his own. ODM has the final say on materials, production, prices and wages.

Earlier, last September, National Production Authority forbade manufacturers to hoard any of 32 critical materials. In October, NPA set aside steel to make 10,000 freight cars per month. Before the end of the year, NPA cut back the quantity of certain materials manufacturers might use—aluminum, nickel, cobalt, copper, tin and zinc. In January, NPA ordered a stoppage, effective March 1, in the use of copper for some 250 end products. Similar cutbacks have been placed on other critical materials.

As defense mounts, controls will get tighter and broader. But unless we stumble into a full-scale war, we may level off by the end of 1952. After that, some prophets see a chance of easing controls.

Meanwhile, some sort of Controlled Materials Plan may be invoked. It worked pretty well during World War II. The theory behind CMP is this: by controlling a few basic materials, you automatically control most others.

What about mining machinery and equipment? Will there be enough of it?

To assure enough machinery, equipment and repair parts for coal and other mining industries, Defense Solid Fuels Administration and Defense Minerals Administration recently set up a Joint Committee on Mining Machinery and Equipment to "coordinate the interests" of DSFA and DMA in presenting claims for materials needed by the mining-machinery industry. DSFA and DMA are claimant agencies for allocations for mining machinery and equipment.

What's the story on prices?

The Office of Price Stabilization Jan. 25 froze prices on all commodities, except below-parity farm products, at the highest level between Dec. 19 and Jan. 25.

If you're in the fix most coal companies are in, you're now getting less for your coal than you got a year ago. Meanwhile, your miners have won two wage boosts and the prices you pay for machinery and supplies are up considerably. In short, you're being squeezed.

How Charles E. Wilson Sees Controls in the Defense Picture

Karsh

"How do we keep our economy from running away?

"There is only one answer—controls. I hate the word. So do you. But there is no other way. Voluntary methods will not work. That has been proved.

"The power of the law must be invoked. It must be used for allocation of materials, for prices, rents and wages—for whatever controls are necessary to prevent inflation, promote production for defense and provide a fair distribution of commodities among our citizens. Whatever the causes of delay up to now, we must proceed with courage, speed and forthrightness to adopt the controls which will insure stability and fairness in our civilian economy . . .

"This mobilization task is primarily the responsibility of your government. Government leaders must set the goals and assign the responsibilities. But its successful achievement is the responsibility of all our people. As citizens, we face a costly and painful effort. It will demand much from us in sacrifice, in courage, in ability."

Can I get a better price for my coal?

There'll be a lot of changes in the original freeze order. It was issued in haste and, in its effect, was unfair to some segments of business and industry.

On Feb. 1 bituminous operators were granted increases averaging 25c per ton; anthracite, 90c. But to make further adjustments, individually and industry-wide, OPS will need facts. Getting the facts is up to you—facts on the kinds and grades of coal you sell, facts on your costs and facts that make your case different from others. These details will be the basis of any appeal you make for a price adjustment.

Thus far, the approach of OPS seems to be fair and reasonable. Your local and regional OPS headquarters will listen to your story and, if it's reasonable and supported by facts, will try to help you. If you think you're being treated unfairly you can ask for a price adjustment under the terms of Price Procedural Regulation 1. OPS will investigate your case and decide. You can protest the OPS decision to a board of review and finally to the Emergency Court of Appeals.

On the other side of the price picture—what you pay for machines and supplies, the freeze steadies an important element in your costs. Here, as in coal prices, there may be some upward adjustments, but on the whole you'll be able to estimate and budget your costs with more certainty than you could 3 mo ago.

What about wages?

The wage freeze came at the same time as the price freeze, on Jan. 25.

Like OPS on coal prices, the Office of Wage Stabilization moved quickly on miners' wages. It confirmed the new wage scale adding $1.60 a day effective Feb. 1. That's another element in your cost structure that's pretty well fixed for a while.

But WSB has some sticky problems ahead. For instance, how will it handle wage demands from labor groups that hadn't won a fifth round before the freeze? Will it adjust inequities that were frozen Jan. 25? How will it handle demands for fringe benefits? Can it work out a formula that, unlike the Little Steel formula in World War II, will stick?

There are some straws in the wind. WSB will allow merit and length-of-service increases where they are established company policy. Also, it probably will support the idea of tying wages to the cost of living.

But cost-of-living clauses don't suit Mr. Lewis. He said last summer that miners' wages wouldn't be tied to the BLS index. And early in January he told WSB that the government could not control prices and therefore should not try to control wages. He said the coal industry can produce 200,000,000 additional tons of coal if the government will leave management and labor alone.

Is coal doing anything to help or protect itself in Washington?

Here are the groups that represent coal in Washington:

National Coal Association, in the Southern Building, is permanent information-gathering agency and legislative advocate for some 60% of the commercial bituminous tonnage. It is staffed with legal, statistical, public-relations, engineering, educational and safety departments.

National Bituminous Advisory Council, formed in March, 1948, at the request of the Secretary of the Interior, keeps the department informed on coal's problems and needs. At various times, it has urged government development of a synthetic-liquid-fuels industry and a solution of the coal-car shortage. It also estimated that bituminous will need 613,000 tons of steel in 1951 and urged the railroads to order 50,000 more coal cars.

Coal Defense Committee, formed last October, is an emergency organization of commercial and "captive" bituminous operators, some of whom also are members of NCA, plus mining-machinery manufacturers. It was set up by the industry to help the government in the defense program and to assure adequate coal to meet the Nation's needs. Offices are in the Southern Building, in Washington.

Anthracite Institute keeps a representative in Washington. His offices are in the Transportation Building.

American Mining Congress is permanent legislative advocate and information gatherer for the whole mining industry, including coal, metals and non-metallic minerals, and for mining-machinery manufacturers. Offices are in the Ring Building in downtown Washington.

Government Alphabet for Coal Men

Set up and operating:

DMA—Defense Minerals Administration
DPA—Defense Production Administration
DSFA—Defense Solid Fuels Administration
DTA—Defense Transportation Administration
ESA—Economic Stabilization Administration
MB—Munitions Board
NPA—National Production Administration
NSRB—National Security Resources Board
ODM—Office of Defense Mobilization
OPS—Office of Price Stabilization
PAD—Petroleum Administration for Defense
WSB—Wage Stabilization Board

I need machinery and equipment. Can anybody help me get what I need?

Defense Solid Fuels Administration probably can help you. It's located in the New Interior Building, in Washington. C. W. Connor, formerly of Armco Steel Corp., is administrator; E. T. Klett, formerly of Anthracite Institute, is deputy; and G. Don Sullivan, formerly of Ayrshire Collieries, is special assistant.

DSFA was created Dec. 5, 1950, within the Interior Department to handle questions of priorities, allocations, requisitions and voluntary agreements concerning coal and coke. It is claimant to NPA for MRO supplies for coal mines and coke plants and joint claimant with DMA for mining equipment and machinery.

Up to now, DSFA has been busy getting set up. It is surveying the industry's needs and, when the time comes, it will present coal's case to the proper control agencies and also, if rationing of coal and coke becomes necessary, will act along that line.

As far as getting equipment is now concerned, there aren't any priorities except DO. And you can't get a DO for equipment. DO's are reserved to the Department of Defense, the Atomic Energy Commission and the airplane manufacturers.

But you can use DO for MRO, if you like. Simply write "DO-97, Certified under NPA Regulation 4" on the purchase order. But be careful. If you use DO-97 on even one purchase, your MRO purchases in any quarter hereafter, whether you rate them or not, will be limited to one-fourth of your MRO costs in 1950 and all your MRO orders will be charged against your quota.

DSFA probably can help you get capital equipment.

Here's what you do if, for instance, you need steel mine cars:

Write to the Administrator, DSFA, or go to see him. Tell him what you need and why you need it. He'll want to know, among other things, the condition of your present equipment, who will buy the coal you want to produce, how much coal you mine, what your coal is used for, whether you've actually ordered the equipment you need, whom you ordered it from and when.

DSFA will carry on from there, passing your request along, if necessary, to NPA with a recommendation. Up to now, neither DSFA nor NPA can force a manufacturer to sell you anything. That power may come later. But they can add their weight to your request and thus make it hard for a manufacturer to turn you down.

Can I protect my men from the draft?

Deferments and reclassifications are handled by your local draft board. They use their own discretion, within existing laws and regulations, the theory being that local boards are familiar with local needs and conditions.

That means its up to you to sell your needs to the local board. On top of that, you'll have to battle each case through on its own merits, since there aren't any blanket deferments and local boards don't pay a great deal of attention to lists of essential industries and critical occupations.

Here's what you do if a key man is classified 1A:

Within 10 days after he gets his classification notice, ask for a review by the Board of Appeal. The Board acts only on the written record and neither you nor your man may appear before it. So, when you file your appeal, state your case as forcefully and factually as you can.

Suppose the Board turns you down. If some one member of the Board has voted in your favor, you may appeal to the Presidential Review Board. If you get turned down there, that's the end of the road.

Either you or your employee may ask for his reclassification. But if you really want your man to stick around, you'd better make the request yourself. You can prove you need him better than he can.

At present, Selective Service takes men in the 19-to-25 age group, excluding fathers, married men and veterans. But things may get tougher as Selective Service gets nearer the bottom of the barrel in its search for 80,000 men per month. Age limits may be lowered or raised, or both, and exempt men may be called up.

If things get too grim for you and if your local draft board isn't sympathetic, carry your story to Coal Defense Committee and DSFA in Washington. If your situation really threatens coal output, they will try to help you.

What's the story on my key men who are reservists? Can I keep them on the job?

That depends on how "key" they are and how well you can prove it.

Bituminous and anthracite mining is an essential activity, as is a sales subsidiary of a coal-mining company. That's official. In addition, there's a list of critical occupations, issued last August by the Labor Department and revised since then. This latter list includes the following: blacksmith, machinist, maintenance mechanic, and electrical, mechanical and mining engineers.

Either you or the man you want to keep can ask for his deferment, unless he's a Marine. If he's a Marine, only he can ask for it. All requests for deferment must be in writing.

Here's how to route your requests that reservists be deferred:

Army reservist, member of active drill unit—Through unit commander or instructor to Commanding General of the Army Area in which he lives.

Army reservist, not member of drill unit—Directly to Area Commanding General.

Navy reservist, officer but not aviator—Through Commandant of Naval District in which he lives to Chief, Bureau of Naval Personnel.

Navy reservist, aviation officer—Through Chief, Naval Air Reserve Training, Glenview, Ill., to Chief, Bureau of Naval Personnel.

Navy reservist, enlisted man not in aviation—

Commandant of Naval District in which he resides.

Navy reservist, enlisted man in aviation—Chief, Naval Air Reserve Training, Glenview, Ill.

Marine reservist—Through the chain of command, starting with local instructor or inspector.

Air Forces reservist—Headquarters Commander of the numbered Air Force in the area where he lives.

National Guard or Air National Guard—Adjutant general of the state in which he lives.

But you can do one thing even before your man is alerted. Here it is:

Make a list of your key men who are reservists or National Guardsmen. Give each man's name, rank or rating, serial number, location, present position, length of deferment requested and your reasons why he is essential. Break down your list according to branch of service—Army, Navy, etc. Send one copy of your lists to the appropriate military commander (see above) and another copy to DSFA. DSFA will relay your lists to the Department of Defense. This won't guarantee your men against a call-up but it will gain some advance consideration for them.

Remember these facts about deferments:

1. Deferment is not an exemption. It's only a delay. First deferment may last up to 6 mo. One extension, up to 6 mo additional, may be allowed.
2. Dependents won't protect a reservist.
3. Deferment may be cancelled at any time.
4. Each request is handled individually. No blanket deferments.
5. Don't ask formally for deferment before your man is alerted. Except in special cases, he'll get 4 to 6 mo notice plus 30 days to report. That gives you time to ask for deferment and get action.
6. If your man is a high-grade specialist—an electronics expert, for instance—the armed forces will take him on short notice.
7. If your man's reserve unit is called as a group, your chances of getting him deferred are slim.
8. Reservists are called up for 21-mo periods. That's rotation. If you don't lose your man now, you'll probably lose him later.

I've got some extra production capacity. Is there a market for it?

There's a lot of defense building and reactivation going on—tank factories, steel mills, power plants, housing, air-force bases and navy yards, to mention only a few. They all need energy and fuel.

The Munitions Board, Pentagon Building, Washington, plays a key role in defense planning. It doesn't buy anything and it doesn't operate anything. But it does help form and coordinate policy among the Army, Navy and Air Force, especially in building and procurement and in conservation of the Nation's resources.

If you want to serve your country better by providing more coal for defense needs, thus easing the strain on oil and natural gas, tell your story to the Munitions Board. The Board will want to know where your mine is, how much you can produce, what kind of coal it is, whether you have men and machines to operate and what transportation is available. With these facts in hand, the Munitions Board might recommend a fuels policy favoring coal in some activity near you.

In fact, by aggressively telling its story of strength and capacity to the Munitions Board, the industry as a whole doubtless could swing into wider fields in the defense effort. As a planning and policy agency, the Board naturally wants oil and gas used where they best serve the national interest. That goes for coal as well. Close liaison with the Board through an industry-wide coal committee would keep coal before the Board and might create new opportunities for coal to broaden its service to the Nation.

Wide World

Winston Churchill Speaks for Coal

"War is made with steel, and steel is made with the aid of coal. Coal is the foundation and, to a very large extent, the measure of our whole war effort."

Can I strengthen my company for tougher times ahead? What can I do right now?

Things may get a lot worse before they get any better. But here are some of the moves you can make to cushion the shock:

1. As fast as you can, up-date your mine and plant for highest efficiency and minimum manpower needs.
2. Schedule plant and equipment maintenance. Some things you've got may have to last a long time.
3. Systematize your purchase records. They'll strengthen your appeal for new materials and machines when you need them.
4. Cement friendships with manufacturers who supply you.
5. Go to Washington and learn your way around the city.
6. Keep your local draft board informed about your company's needs.
7. Inventory your manpower needs. List them job by job, with experience and skills needed. This will help in seeking deferments and reclassifications.
8. Start to train somebody now for every key job in your outfit.
9. Develop good contacts with federal and state employment agencies and with technical and vocational schools in your area.
10. Improve working and living conditions, win your miners' loyalty and make your jobs good jobs. That'll offset the lure of new jobs in airplane plants and shipyards.
11. Up-date your list of former employees, retired men and job-seekers. That way, you'll know where to turn if you need more men.
12. Simplify jobs wherever you can. That'll cut your needs for skilled men, shorten training periods and enlarge manpower reserves.
13. Make advance plans to guard against absenteeism.
14. Get your present workers to recommend relatives or friends for jobs. Offer a cash award for finding new workers who stay on the job for, say, 60 days.
15. Keep a detailed record of your costs. It may help you get a price adjustment.
16. Keep in close touch with your senators and representatives in Washington. Tell them what your problems are, how business is, what troubles you're having getting materials and equipment, how controls are working in your area and how you'd like to see them vote on current issues.

Job-Rated Equipment Helps West Exeter Overcome Natural Obstacles

CONCENTRATED MINING, conveyor transportation and the use of mining equipment requiring a minimum of service labor help West Exeter achieve high productivity per man-shift in spite of natural obstacles.

CONNECTING CHUTE crosses 29-ft displacement in vein. Plastic air line (right) has required flexibility for economical service.

SCHEDULED LUBRICATION is vital to continuous operation. The brattice-men (left) erect masonry stoppings to guide ventilating air.

PERMISSIBLE EXPLOSIVES and delay blasting produce high percentage of lump coal from pillar slice. Long cuts permit larger crews.

FACE-TO-SLOPE TRANSPORTATION is provided by 12- and 15-in chain conveyors which can be reversed to move supplies.

MAIN-ENTRY CONVEYORS, operating in tandem, are installed on uniform grades set by transit to insure trouble-free transportation. Connecting chutes in rockholes at faults eliminate long haulage planes and rock tunnels.

West Exeter Finds Faults No Bar to . . .

Efficient Conveyor Mining

Problem of Major Vein Displacements Solved by Use of Conveyors for Transportation

Carbide-Tipped Bits and Plastic Air Lines Improve Drilling and Cut Service Labor

By HAROLD DAVIS, Assistant Editor, Coal Age

CONCENTRATION of working places and complete conveyor transportation to the foot of the main slope have resulted in production per man-shift of as high as 6.8 tons at West Exeter mine, West Exeter Coal Mining Co., Exeter, Pa. T. R. Lewis, president and designer of the mining system, reports that 56 men (28 producers) loaded 385 tons on the best shift. Although the average is somewhat less it still is high for anthracite mining.

The workings are in the 68-in Bottom Checker vein, which has 10 in of rock through the middle. The vein does not pitch steeply, but mining is complicated by the presence of two faults, or jumps, across the property. One has a displacement of 14 ft and the other 29 ft.

The mine was opened in September, 1947, on the eastern side of an existing barrier pillar for the purpose of recovering solid coal east of the barrier and room pillars to the west. Access to the room pillars was gained by driving four openings through the barrier pillar with the permission of state authorities. Pillar extraction west of the barrier now is complete and the four openings are in the process of being sealed by packwalls and reinforced concrete dams. Reinforcement for the concrete walls is provided by a lattice of 30-lb rails on 12-in centers, and the dams are to be locked into the roof, floor and ribs in 18-in-deep hitches.

• **Rockholes Span Faults**—The main opening is a rock slope through 120 ft of cover. Near the foot of the slope the first jump was encountered and a rockhole was raised through the 14-ft interval to the upper continuation of the vein. A loading pocket was built at the foot of the rockhole to receive the slope cars.

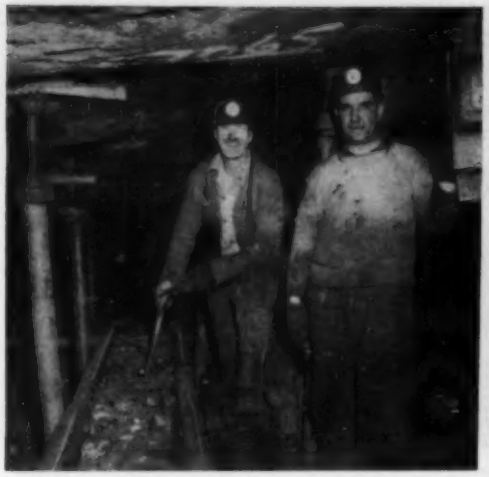
All transportation inby this first jump is provided by LaDel chain and shaking conveyors, with chain conveyors predominating because of adverse local rolls. The main conveyor discharges to a steel chute in the rockhole and through the pocket into the slope car. The car is dumped into a surface bin from which trucks haul the run-of-mine to a nearby preparation plant.

A turnout at the foot of the slope near the pocket holds an extra car to permit continued loading while the previous load is hoisted.

A similar chute at the 29-ft jump, which is 1,600 ft inby the first jump, transfers the coal over the displacement in the main conveyor line. The rockhole at each fault also is provided with a manway and supply track with buggy for handling supplies and mechanical equipment.

• **Why Conveyors Are Used for Haulage**—Mr. Lewis' reasons for selecting conveyors as the transportation medium were predicated

Conveyor Transportation Eliminates Need for Underground Planes



MACHINIST AND ELECTRICIAN, Bob Evans (left) and Mike Girman, patrol conveyor lines to check installation and detect trouble.

SECOND OPENINGS are provided at each fault so damage to rockhole will not trap men in by fault zone.

CARBIDE-TIPPED BITS equipped with core cutters, and rotary-type pneumatic drill, successfully penetrate this extremely hard coal.

DEEP HITCHES in barrier pillar openings will lock reinforced-concrete in place to seal robbed area.

on core records from prior borehole drilling in the area. Location of the faults was fixed by these records, and it was calculated that excessively long rock planes would be required to cross the jumps if track haulage was chosen. Therefore, the combination of short rockholes and conveyor transportation was chosen to eliminate the need for two planes and the necessary men and equipment to operate them.

As shown in the accompanying mine diagram, surface development prohibited pillar extraction in the south portion of the mine. Steady production was maintained, however, by balancing this work with pillar recovery west of the barrier pillar, and concentration of most of the effort in the south portion resulted in completion of this section in 5 mo of two-shift operation.

Now, all crews are in solid coal east of the barrier between the robbing limits. Rooms are driven 24 ft wide on 50-ft centers and pillars are extracted immediately. Crew size varies according to the length of rib available for mining. Usually, three men advance a room and four or five men load pillar coal when a long slice is cut out.

Upon completion of operations in the Bottom Checker vein the system of mining will be applied to the Top Checker. Two 32-ft-long rockholes have been raised at 45 deg to the upper vein to serve as a chute and second opening. Coal from the main conveyor in the Top Checker will descend through the rockhole to a conveyor on the lower level for transfer to the car-loading pocket at the foot of the main slope.

• **Plastic Air Lines Serve Drills**—Drilling practice at West Exeter

ROCKHOLE from Bottom Checker vein to Top Checker will provide transportation link to existing conveyor system.

WEST EXETER STAFF includes George McCoola (left), foreman, William George, miner and Andrew Prebola, welder.

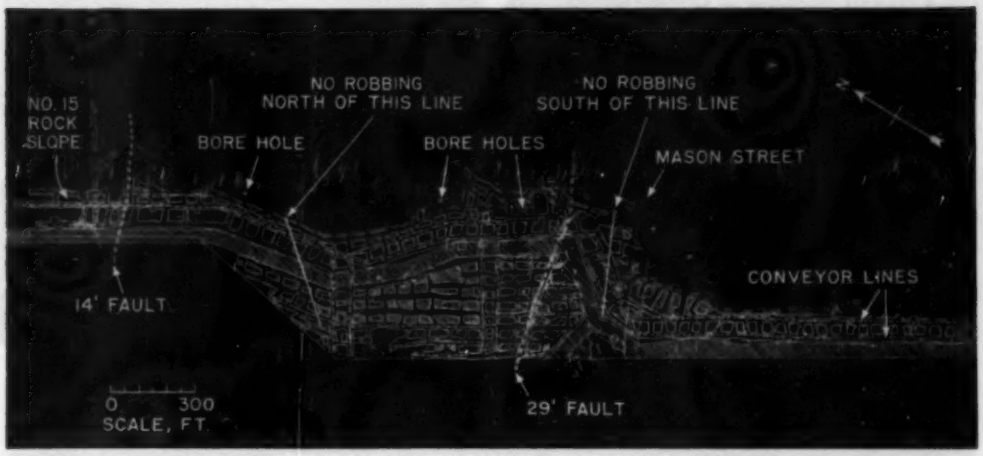


DIAGRAM OF WORKINGS at West Exeter shows sequence of recovery and trace of fault lines across property. Pillars west of the barrier have been recovered and breakthroughs now are being closed.

features carbide-tipped bits, plastic air lines and rotary-type pneumatic tools. Since the coal is extremely hard and contains some sulphur inclusions, drilling with percussion-type tools was slow and expensive because of the frequent bit changes required.

Rotary-type Thor pneumatic drills and Kennametal bits were tried and improvement was noted. However, the short core of coal left by the cutting elements of the Type D 1 7/8-in bit was strong enough to prevent effective advance of the drill. Now, Type DC 1 7/8-in bits are used. These are equipped with core cutters which successfully break out the core to permit the cutting edges to work against the face of the hole. The continuous rotation of the steel and the action of the core cutter keeps the bit against the work for best drilling and minimum chipping of the carbide inserts.

Compressed air is supplied by an Ingersoll-Rand compressor on the surface through steel 2-in pipe to the foot of the slope. From this point the distribution system consists of 2-in plastic pipe, Johnsonite, which is supplied in 200-ft lengths. The advantages of the plastic pipe are light weight, corrosion resistance, flexibility, and quick installation and repair, all helping to reduce service labor on air-distribution lines.

A minimum of maintenance is required to keep conveyors operating because lubrication and inspection are scheduled and the conveyor lines are uniformly graded by transit.

Second openings are made at each of the faults to provide escapeways for emergencies.

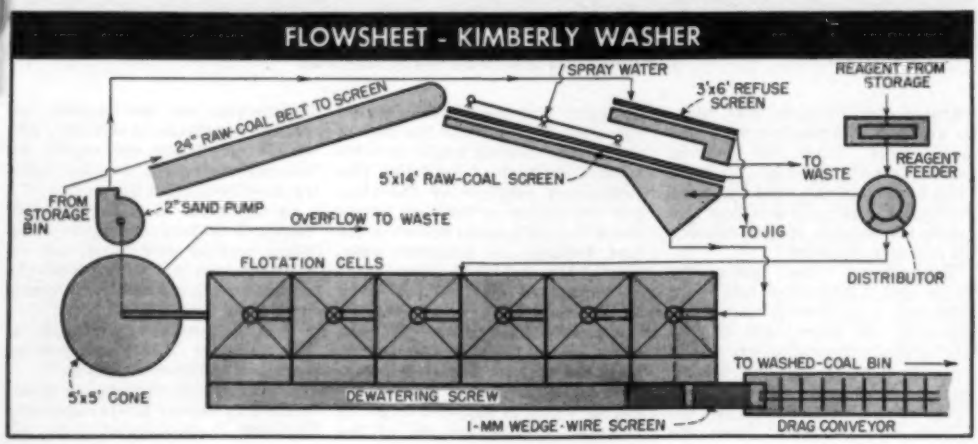
Underground supervision is exercised by Robert Russavage, mine foreman.

Sloss-Sheffield Finds Low-Cost Answer for Fine-Coal Cleaning in . . .

ACTION OF WATER SPRAYS and vibrating screen at Kimberly drops fines into a hopper beneath screen. Pulp thus formed is pumped into the first of six flotation cells. Cup feeder and distributor (right) controls kerosene flow. Three-fourths of the reagent goes to the pulp in the hopper; remainder is fed into the fourth cell.

KIMBERLY CELLS get a once-over from Mr. Schiffman (left) and J. C. Snow, superintendent. Experimental three-paddle rake, second from front, skims entire width of cell.

SCREW EXTRUDES floated fines through a 14-in pipe as Mr. Schiffman inspects product. Two screen sections in pipe, plus squeezing action of screw, help remove water.



Floating Fines With Kerosene

With Coking Coal the Goal, Sloss Sheffield . . .

- Floats Raw Coal and Sludge
- Gets Low-Ash Coal for Blast Furnaces
- Cuts Loss of Good Coal in Plant Refuse
- Improves Jig and Screen Performance

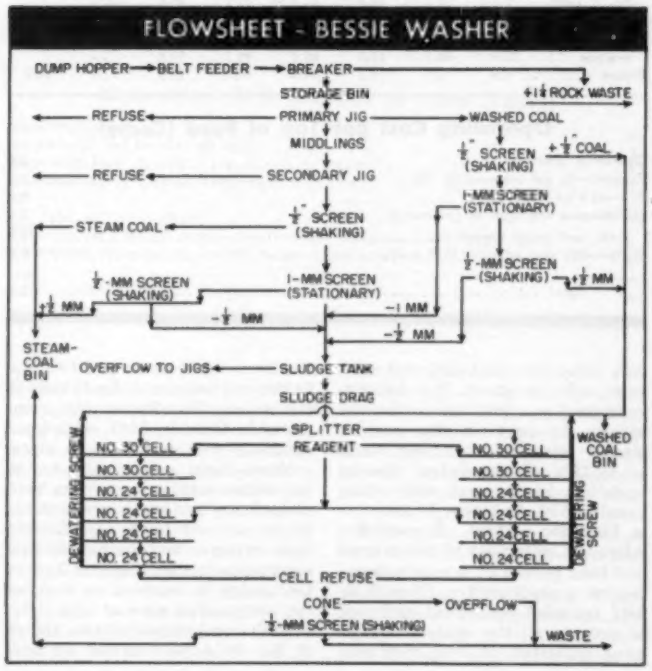
BY L. E. SCHIFFMAN
Engineer, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala.,
AND E. DALTON WHITE
McGraw-Hill Atlanta Bureau

KEROSENE FLOTATION is effectively cleaning fine coal at two Alabama mines of the Sloss-Sheffield Steel & Iron Co. In fact, the method has proved so effective that a larger plant will be installed at a third operation—Flat Top.

The decision leading to experimentation in kerosene flotation of fines came when the company analyzed the minus-1-mm material at its Bessie mine, following reopening in 1942 and installation of a new preparation plant to clean 1¼x0 coal from the Mary Lee seam.

Investigation showed that the sludge ash was about 15 to 20%, against 10% for the coarser coal. This was sufficiently high to present a fine-coal cleaning problem, and some corrective action was considered necessary.

About the same time, tests were made at the Flat Top mine, where Sloss-Sheffield had installed new washing equipment in 1943 to clean 1⅛x0 Mary Lee coal. Much valuable information was gained in determining the reasons for higher ash and effectiveness of the jig in removing rock and slate. It was apparent that here, too, there was a fine-coal cleaning problem. Consequently, Sloss-Sheffield embarked upon a comprehensive and systematic study of conditions at the two mines. This finally led to the installation of the kerosene-flotation system for sludge at Bessie mine and the flotation of raw coal at Kimberly mine.



● **Coking Quality the Goal**—Fine coal is valuable to Sloss-Sheffield since it is desirable for coking. Thus all coal used by the company for blast-furnace operations is crushed to ¼ in. The company operates four coal mines, all within a 20-mi radius of Birmingham, Ala., and produces 1,250,000 tons of washed coal per year. Three of the mines are in the Mary Lee seam and one is in the Jefferson. Most of the output goes into the making of blast-furnace coke, although some steam and domestic coals are produced.

Another factor of importance to Sloss-Sheffield is that low-ash coal is of great advantage in metallurgical use. On the basis of blast-furnace practice, it is estimated that each per cent ash in the coal reduces the value of the coal by 22c per ton. Any method that would lower the ash content would carry with it an operating cost advantage. The increased value of lower-ash coals provides a considerable margin which can be used on coal-cleaning operations.

The new preparation plant at Bessie included a McNally-Norton five-compartment primary jig and a smaller two-compartment secondary jig. These were supplemented by 1-mm screens for dewatering the washed products and a sludge-settling tank for recovering the solids in the screen underflow.

● **The Sludge Problem**—The minus-1-mm fines thus were obtained as a separate product before being mixed with the coarser coal. This made ready analysis possible. Tests showed ash content of about 10% in the coarser coal and from 15 to 20% in the sludge. This revealed the point where corrective action could be taken, and an immediate study was undertaken.

In the meantime, attention was

directed to the Flat Top washing equipment. This included jigs duplicating those at Bessie, which replaced six plunger-type jigs. However, dewatering equipment for primary coal had not been installed.

Analysis of the primary coal showed higher ash than had been produced with the old equipment. Adjustments failed to produce better results. However, it was determined that the higher ash resulted from the fact that in the new Baum-type primary jig the fines, including that portion of the rock and slate not removed by the jig, remained in the washed coal.

Sink-and-float tests, together with screen analyses of the jig products, indicated that down to 14-mesh the jig did a good job, down to 35-mesh a fair job, and below 35-mesh a poor job. In other words, the jigs were not making a good separation below 1 mm. Further, it was found that approximately half the fine impurities were caused by mining methods, being in the coal delivered to the tipple, and half by the Bradford breaker in the preparation plant.

The minus-35-mesh coal is about 10% of the total primary feed and, although it has high ash content, there is an advantage in its retention. Previously it had largely been wasted. But retention of these coal fines brought about a cleaning problem.

Sludge Flotation

The decision to experiment with sludge flotation came as a result of discussions between B. W. Gandrud, of the U. S. Bureau of Mines, and Sloss-Sheffield engineers on results secured in laboratory experiments.

Bessie mine was selected for the kerosene-flotation experiment because the fine coal was already available as a separate product in the form of sludge from the settling tank. Sloss-Sheffield constructed and installed a flocculation cell and experiments proved that a good separation could be made. Therefore further experimentation was decided upon.

Next, a Denver No. 24 two-cell Sub-A flotation unit was installed but modified to include a raking device instead of the conventional paddle to remove the floated product. A product of about 8% ash was turned out but the refuse leaving the cells was low in ash. It was evident that more than two cells in series would be required to hold loss of coal in the refuse to a reasonable percentage. Two additional cells were then installed, and with four cells in series the flotation equipment was put into continuous service as part of the regular washer operation, handling about 10 to 15% of the sludge. Results were found to be good, with refuse running 50% or higher in ash.

• Flotation Plant Expanded— After the suitability of the process had been proved by a year's operation on a small portion, Sloss-Sheffield installed equipment sufficient to process all the sludge. Equipment consisted of two additional No. 24 two-cell units and two No. 30 two-cell units, making 12 cells at the mine. Installation was completed in October, 1947, with good results in continuous service since.

Minus-1-mm coal is delivered to the sludge settling tank from both the primary and secondary circuits. It is removed by a slow-moving drag conveyor and discharged into a stationary splitter so that half of the sludge is received by each of the two parallel rows of cells.

Each row consists of two 100-cu ft No. 30 cells, followed by four

Here Are the Facts About Bessie

SEAM—Mary Lee
OUTPUT—{ 1,000 tpd of coking coal; 1,000 tpd of secondary coal
REAGENT—5 lb of kerosene per ton of feed

AVERAGE OF DAILY RESULTS

	With Flotation, 12 Months Ending Aug. 31, 1949	Before Flotation, 6 Months Ending Oct. 31, 1947
General washer results		
Raw coal, 1¼x0—per cent ash	31.9	30.4
Washed coking coal, 1¼x0—per cent ash	10.1[1]	11.4
Secondary coal—per cent ash	17.3	13.3[2]
Float in jig refuse at 1.45 sp. gr.—per cent	3.0	3.2
Flotation details		
Raw sludge—per cent ash	20.0	—
Floated coal—per cent ash	8.2	—
Secondary coal, oversize from reject—per cent ash	24.6	—
Refuse from flotation—per cent ash	55.5	—

[1]Includes floated coal.
[2]Secondary coal, 275 tpd, compared with 125 tpd, first column.

Typical Screen Analyses—Cumulative Per Cent

	PER CENT RETAINED ON 6-Mesh	10-Mesh	14-Mesh	20-Mesh	35-Mesh	65-Mesh	100-Mesh	200-Mesh
Cell feed	6.1	18.2	29.1	45.2	72.8	86.5	91.3	95.5
Floated coal								
No. 1 cells	0.0	4.1	14.0	31.8	70.3	85.1	90.5	
No. 2 cells	1.1	8.1	20.9	41.8	81.4	91.1	91.7	
No. 3 cells	0.4	8.4	16.0	27.8	76.1	86.7	88.6	
No. 4 cells	1.1	13.8	29.9	50.5	87.6	93.3	94.1	
No. 5 cells	0.7	16.3	30.5	50.0	80.5	91.2	92.2	
No. 6 cells	2.1	20.1	35.6	55.2	77.7	82.5	84.6	
Total, all cells	0.3	6.2	17.2	36.9	71.4	86.2	91.4	95.9
Secondary coal, oversize	22.6	50.4	67.9	85.0	98.7	99.6	—	
Refuse	0.5	2.1	4.3	10.8	40.5	63.8	73.5	84.9

Operating Cost per Ton of Feed (Cents)

Operating labor	0.0
Reagent—¾ gal kerosene @ 10c	7.5
Power—2.9 kw-hr @ 1c	2.9
Maintenance and supplies (estimated)	3.0
Total, cell plant proper	13.4
Water—250 gpm against 125-ft head	0.4
Total	13.8

Here Are the Facts About Kimberly

SEAM—Jefferson
OUTPUT—475 tpd of coking coal
REAGENT—4.5 lb of kerosene per ton of feed

AVERAGE OF DAILY RESULTS

	With Flotation, Month of August, 1949	Before Flotation, 6 Months Ending Mar. 31, 1949
General washer results		
Raw coal, 1½x0—per cent ash	22.4	22.5
Washed coal, 1½x0—per cent ash	6.7[1]	10.4
Jig refuse—per cent ash	70.4	66.0
Float in jig refuse at 1.45 sp. gr.—per cent	3.8	4.8
Hutch solids—per cent ash	51.0	36.3[2]
Flotation details		
Raw coal to cells, 10-mesh x 0—per cent ash	23.5	—
Floated coal—per cent ash	5.1	—
Coal reject oversize to jig—per cent ash	31.6	—
Refuse from flotation—per cent ash	58.2	—

[1]Includes floated coal.
[2]Average of a few snap samples. Routine samples not available.

Typical Screen Analyses—Cumulative Per Cent

	PER CENT RETAINED ON							
	6-Mesh	10-Mesh	14-Mesh	20-Mesh	35-Mesh	48-Mesh	100-Mesh	200-Mesh
Cell feed	0.1	5.1	14.6	28.3	52.8	66.9	81.1	91.0
Floated coal								
No. 1 cell	0.0	1.0	5.4	15.8	44.4	58.9	—	
No. 2 cell	0.0	1.6	8.1	21.4	50.8	63.3	—	
No. 3 cell	0.0	2.4	9.8	25.8	54.7	66.8	—	
No. 4 cell	0.0	2.6	10.7	26.5	55.4	67.7	—	
No. 5 cell	0.0	3.1	13.2	29.2	56.0	66.9	—	
No. 6 cell	0.0	5.2	18.2	36.0	60.4	69.1	—	
Total, all cells	0.0	2.6	11.7	26.0	52.9	64.3	79.9	89.3
Oversize, to jig	2.1	57.4	86.4	96.2	99.0	—	—	
Refuse	0.1	4.1	13.6	26.1	47.6	55.1	—	

Operating Cost per Ton of Feed (Cents)

Operating labor	0.0
Reagent—0.7 gal kerosene @ 10c	7.0
Power—4.5 kw-hr @ 1.5c	6.8
Maintenance and supplies (estimated)	4.0
Total, cell plant proper	17.8
Power for water supply, screening and material transport—2.8 kw-hr @ 1.5c	4.2
Maintenance for water, screens and transport (estimated)	2.0
Total	24.0

50-cu ft No. 24 cells, all in series. Floated coal is removed by raking and is discharged into two dewatering screws, each of which runs the length of a cell row. The discharge end of each screw projects over the drag conveyor that carries the jig-plant washed coal to the loading bin. The screws serve the double purpose of dewatering and conveying. Drainage from the dewatering screws is returned to the first cell in each row by a side inlet. Unfloated material, having traveled through the six cells in series, is discharged into a 6-ft cone to permit the coarser material to settle.

Cone underflow is pumped to a shaking screen equipped with ½-mm screen cloth and the screen oversize is recovered as secondary coal. Underflow from the screens joins the overflow from the cone and these two products—the refuse from the flotation plant—are sent to waste.

● **Pulp Not Conditioned**—Sloss-Sheffield does not condition the pulp before it goes to the cells. This pulp averages about 24% solids by weight. The reagent flows by gravity from a 6,000-gal storage tank through a cup feeder and a rotating distributor into the pulp streams at the splitter (75%) and into the inlets of the fourth cells (25%). The flotation plant receives an average of about 22 tph of sludge containing about 20% ash. This tonnage is divided into approximately 14 tons of floated coal (8% ash), which goes into the primary coking coal; 4 tons of oversize reject (24% ash), which goes into the secondary coal; and 4 tons of refuse (56% ash), which goes to waste.

While the 5 lb of reagent used per ton of feed is greater than used in laboratory tests, it is not considered excessive because of fluctuations in the feed. Originally, a mixture of kerosene and B23 frother was used as reagent. At present, only kerosene is used.

There is a wide swing in cell feed, with an average of 22 tph and a peak of 45, but the units have a remarkable capacity for absorbing the maximum rates, which are of comparatively short duration. Reagent is set for average rather than maximum rate and the cells deliver a floated product at a rate much more uniform than the feed rate.

Based on operating results, it is believed that a uniform feed rate would reduce coal loss in the refuse, reduce reagent consumption and increase cell capacity. However, satisfactory operations have been obtained even with the fluctuations in the cell feed.

Raw-Coal Flotation

Success of the flotation at Bessie, investigations at Flat Top and experiments by Mr. Gandrud provided the basis for installation of equipment at the Kimberly mine for the flotation of raw coal.

Advantages appeared to warrant an experimental-plant recovery of all the coal, even that lost in the effluent, as cell feed. At Bessie this was estimated at 20 tpd. Other advantages included higher equipment efficiency, elimination of settling tanks and the slurry problems, and better jig performance.

Kimberly, in the Jefferson seam, was selected for raw-coal flotation because it is a comparatively small mine, 450 to 500 tpd. Another reason was that the fines in the washed coal were high in ash and an expected over-all reduction of 3% would be profitable.

Based on experience at Bessie, it was decided to install a single row

of six 100-cu ft No. 30 cells for a capacity of 20 tph. The plant went into service in April, 1949.

• **Preparation at Kimberly**—Coal at Kimberly is crushed to 1¼ in at an underground screening and crushing station and elevated by belt to a 300-ton storage bin. A 24-in belt brings the coal from the bin to the washer and delivers it onto a single-deck 5x14-ft vibrating screen equipped with a No. 5185 Ton Cap screen cloth. The equivalent opening of the screen is about 9 mesh. Water at the rate of 250 gpm from three rows of sprays covers the deck. Screen oversize discharges into a 50-tph Montgomery jig. A bucket elevator and drag convey the washed coal to a loading bin and a bucket elevator carries the refuse to a rock bin for trucking away.

The vibrating-screen underflow falls into a hopper and an 8-in pipe conveys it to the six flotation cells in series, the pulp passing through only once. Unfloated material is rejected in the last cell. The reagent flows by gravity from a 6,000-gal storage tank through a cup feeder and distributor to the hopper beneath the screen (75%) and to the fourth-cell inlet (25%).

• **Screw Dewaters Coal**—Each cell is equipped with a raking mechanism to remove the floated coal. The coal is discharged into a 14-in dewatering screw. The screw trough is a 14-in pipe, which extends 20 in beyond the end of the screw and forms a nose through which the coal is extruded. The squeezing action helps remove the water.

Near the discharge end of the screw, in the bottom of the 14-in pipe, are two sections of wedgewire screen 60 in long, 11 in wide and curved to a 7-in radius, through which water is squeezed by the screw action. Water so removed is returned by a side inlet into the impeller in the first cell.

The floated coal from the screw discharges into a drag conveyor and is dragged up a 35-deg incline to the coarse-coal drag for mixing with the main body of coal and storage in the loading bin.

The unfloated material leaving the last cell is discharged into a 5-ft-diameter 5-ft-high dewatering cone. Cone underflow, containing the coarser reject material, is pumped by a 2-in sand pump to a 3x6-ft vibrating screen equipped with 10-mesh cloth.

• **Screen Set-Up Protects System**—Screen oversize goes to the jig with the coarser coal. Undersize joins the overflow from the dewatering cone. Together, these two constitute the flotation-plant refuse.

This screening arrangement has a number of advantages.

First, it guards the circuit against loss of coal when material too large for flotation appears.

Second, it prevents the loss of intermediate-gravity coal near the upper limit of flotation size. Although kerosene flotation will float low-gravity particles of 10-mesh or larger, middle-gravity material is more difficult to float. The screening arrangement thus recovers 10-mesh particles somewhat high in ash, which are too good to discard but which otherwise would be lost in the refuse.

Third, the guard screen makes it possible to use a main-screen mesh size that is the top size for flotation.

Under the present operating schedule, the flotation plant receives a feed of 12 tph of minus-10-mesh coal (23% ash). Pulp density varies from 15 to 20%. It produces about 7¾ tons of floated coal (5% ash), returns ½ ton of unfloated material (about 30% ash) to the jig, and sends 3¾ tons of refuse (58% ash) to waste.

• **Kimberly Results**—All expected advantages have been realized in flotation at Kimberly. Before the installation, the hutch discharge from the jig analyzed 36% ash, indicating a coal loss of roughly 6 tpd. The hutch material now is about 10% of the former quantity and the ash content is about 51%. This loss is too little to worry about.

Jig performance has been increased along with capacity. After installation of flotation, the elevator conveying the washed-jig product was speeded up about 20% and a further increase is planned. Before flotation, the ash in the jig refuse averaged 66% and the float in the jig refuse was 4.8% at 1.45. Now the ash in the refuse is 70% and the float is 3.8%.

Before flotation, the average ash of Kimberly output was about 10.4%. Now, the average is 7%.

Screening performance has been better than expected. At a feed rate of 1.52 tph of dry coal per square foot and a spraying rate of 3 gpm per cubic yard per hour, 82.5% of the 10-meshx0 appeared in the undersize with 89% of the 14-meshx0, and 93% of the 20-meshx0.

At a feed rate of 1.80 tph per square foot and a spraying rate of 2.6 gpm per cubic yard per hour, 77% of the 10-meshx0 appeared in the undersize, with 83% of the 14-meshx0, and 87% of the 20-meshx0.

Experimental work with a homemade conditioning unit for agitating the mixture of pulp and reagent showed no evidence of advantage in the original experimental flotation at Bessie mine. Therefore, conditioning units were omitted at both Bessie and Kimberly. Also, original experimental work with a mixture of 93% kerosene and 7% B23 frother showed no definite advantage for the frother. As a result, Sloss-Sheffield now uses only kerosene.

• **Low Moisture Unnecessary**—Because it is unnecessary, no attempt has been made to reduce moisture in the flotation product to as low as 25% by use of the dewatering screw. At Bessie, the moisture content of coal discharged from the screw varies from 34 to 45%, with the average about 37%. At Kimberly, it varies from 44 to 52%, with the average about 47%.

The floated coal drains readily in the loading bins and railroad cars and is sufficiently dry by the time it reaches the coking plant 24 to 48 hr later. The reason why the floated coal drains readily without loss of coal is that the process has put it in a flocculated or matte condition. Also, most of the fireclay usually in the fines has been removed by the process.

Sloss-Sheffield has found that effectiveness in kerosene flotation, as in coarser-coal cleaning, becomes poorer below a limiting size. This appears to be 200-mesh or below for kerosene flotation. The probable cause is indicated by the fact that in the minus-200-mesh there is entrapment of fine refuse and suspension of fireclay in the water carried with the floated coal from the cells.

• **Operating Cost Reasonable**—Experience shows excellent results from flotation. At Bessie, with a feed of 22 tph of minus-10-mesh sludge carrying 20% ash, a floated product of about 8% ash is produced at an operating cost of 14c per ton of feed. The capital investment is about $1,800 per ton-hour of capacity.

At Kimberly, with a 12-tph feed of minus-10-mesh raw coal screened out ahead of jigging and carrying 23% ash, the plant is producing a floated product of about 5% ash at an operating cost of 24c per ton of feed. The capital investment is about $2,200 per ton-hour of capacity.

The new system to be installed at Flat Top mine will have a feed capacity of 40 tph.

Promoting Electrical Safety with . . .

The Short-Circuiting Contactor

What the Short-Circuiting Contactor Is
How It Can Improve Electrical Safety
How It Functioned in Mine Tests

By L. H. HARRISON

Mining-Electrical Engineer, Bureau of Mines, Birmingham, Ala.

IN COAL MINES where electrically powered equipment is used, protecting electrical circuits and machinery takes on added importance because the hazards of fires and explosions resulting from electrical failure are greater than in most other industries. There is need for better methods and improved protective devices for this service. Studies and tests recently completed in the laboratory and in three operating coal mines indicate that the short-circuiting contactor has real possibilities as an electrical-protective device.

Electrical protection in coal mines normally is of three types:

1. Overload protection intended to prevent damage from overheating and excessive mechanical stresses.

2. Short-circuit protection providing a means of de-energizing the equipment instantly when an accidental short circuit occurs in the equipment or the power system. Short-circuit protection tends to prevent damage from fires and explosions resulting from the dissipation of large increments of electrical energy in a short circuit.

3. Ground - fault protection which, in its various forms, is designed to maintain the frames of electrical equipment at or near the same potential as the earth, or the surfaces in contact with the earth, to safeguard human life.

The short-circuiting contactor is intended primarily for protection against damage from accidental short circuit.

The operator using electrical equipment has, in general, the choice of installing fuses or circuit breakers to protect equipment from the effects of electrical failures. In many instances both devices are used in the same mine. Although fuses and circuit breakers have been used widely for many years, they have objectionable characteristics inherent in their designs, and these have not been overcome after many years of experience in coal mines.

Recently, the trend has been toward automatic circuit breakers to provide adequate protection for trailing cables and other cables of a more permanent nature. When properly maintained, the automatic circuit breaker unquestionably provides the best known method of short-circuit protection. However, as developed and used for mining service, it has two objectionable characteristics from the mine owner's standpoint:

1. High first cost. The construction of a circuit breaker entails designing an intricate tripping mechanism and elaborate means for arc interruption.

2. High maintenance cost. The characteristics of a high-speed circuit breaker are such that it opens at or near the maximum current. Especially with DC circuits, the arc produced by opening the circuit at the instant of maximum current contributes largely to the high cost of maintenance.

The automatic circuit breaker has not been generally accepted as a protective device by the mining industry. This is particularly true of the smaller operations, in which a slight increase in capital investment or higher maintenance cost might mean the difference between profit or loss for the operation.

Contactor Benefits

Definitely improved methods of electrical protection are needed for coal-mine service. The principle involved in the short-circuiting contactor seemed to offer some hope for the development of a simple, inexpensive device that would provide adequate protection. Consequently, an investigation was undertaken to discover its possibilities. The work was carried on under the general direction of J. J. Forbes, chief, Health and Safety Division, Bureau of Mines, and the direct supervision of M. C. McCall, chief, Accident Prevention and Health Division, Region VII, Bureau of Mines, Birmingham, Ala.

The results of this investigation and information from other sources indicate that the short-circuiting contactor offers possibilities for the development of a simple, sturdy and inexpensive protective device for mine electrical circuits. Such a contactor, in combination with an ordinary fuse, can be made to provide high-speed short-circuit protection for electrical circuits approaching that of the best air circuit breakers.

The short-circuiting contactor has the obvious disadvantage that it must be used in conjunction with a fuse or other circuit-opening device. However, this disadvantage appears to be outweighted by the advantages, the most important of which are:

1. The short-circuiting contactor not only reduces the voltage across the fault resulting from the system voltage but also reduces the voltage across the fault from the generator action of the motors on the inby side of the fault. An ordinary circuit breaker has no effect on this regenerative voltage.

2. The short-circuiting contactor in effect removes the short circuit from its original location to a less hazardous one and therefore is an improvement from the safety standpoint.

3. The first cost of such a contactor should be much lower than that of an equivalent circuit breaker on the same production scale.

4. The maintenance costs, excluding fuse replacements, may be lower than that of an equivalent circuit breaker because of simpler construction and the elimination of destructive arcing.

The author is grateful for the

To be published by the Bureau of Mines as Report of Investigations 4759, "The Short-Circuiting Contactor as an Electrical-Protective Device for Coal-Mine Service."

Better Protection the Goal With Short-Circuiting Contactor

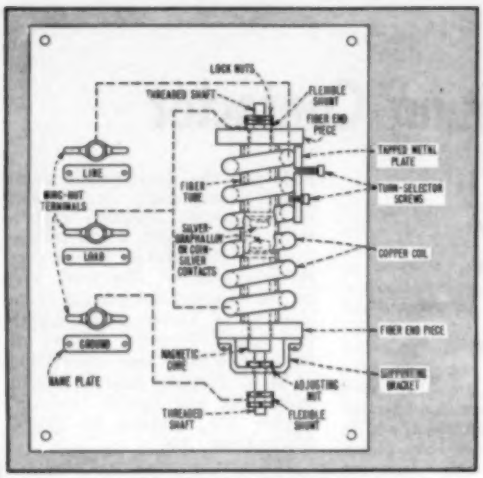


FIG. 1—HOW THE SHORT-CIRCUITING CONTACTOR was assembled for test work at mines.

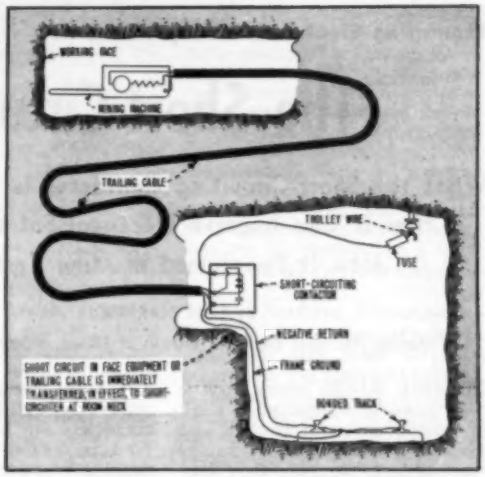


FIG. 2—HOW THE SHORT-CIRCUITING CONTACTOR is used for protecting mining machine and cable.

assistance and cooperation of the following persons who made this investigation possible: T. E. Costner, general superintendent; J. C. Snow, superintendent, Kimberly mine; Judson Sides, superintendent, Lewisburg mines; and D. S. Walker, safety inspector, Lewisburg mine, Sloss-Sheffield Steel & Iron Co.; and L. A. Michael, superintendent, and C. S. Mauldin, chief electrician, Parrish mine, Railway Fuel Co.

Contactor Design

The short-circuiting contactor is essentially a device designed to close its contacts when a predetermined current flows through the operating coil. It is so connected in the circuit that when closed the contacts will short-circuit the power system. A fuse or other circuit-opening device is used with the contactor to de-energize the circuit when the contactor closes.

The short-circuiting contactor covered by this investigation is intended to provide a staple method of obtaining high-speed protection against damage from accidental short circuits on mine-power systems. It is particularly adaptable to the protection of trailing cables or semi-permanent cables serving electrical mining equipment at or near the working faces. It also is applicable to the protection of trolley and feeder circuits of a more permanent nature, as well as being capable of providing high-speed ground-fault protection for electrical equipment when properly applied.

When an accidental short circuit occurs on a cable protected by a short-circuiting contactor, the current flowing through the operating coil of the contactor immediately closes the short-circuiting contacts. A positive short-circuit is thus created at a predetermined location, which immediately and effectively reduces the voltage across the accidental short circuit substantially to zero.

At the same time the short-circuit current flowing through the fuse melts the fusible element and de-energizes the circuit. If the power system does not supply enough current to blow the fuse, the short-circuiting contactor will remain closed, thus maintaining nearly zero voltage across the fault which originally caused it to close.

Contactor Construction

Fig. 1 shows the contactor assembly constructed and used in tests in this investigation. Fig. 2 is a diagram showing how the contactor is connected in the circuit when used as a protective device. The short-circuiting contactor shown in Fig. 1 does not necessarily represent the construction that would be used in a commercial device. It was built as follows:

A 1¾-in. outside-diameter fiber tube approximately 6 in. long was threaded on each end to fit a pair of fiber end pieces made from ½-in. stock properly machined and tapped to receive the threaded tube ends. The end pieces were 3 in. square and were drilled and tapped on one face for the mounting screws. This assembly was mounted on the front of a 12x15-in. insulating panel by four cap screws. A coil of six turns of 2/0 copper wire was formed, with the ends brought out tangentially and threaded. When assembled, the threaded ends of the coil extended through the insulating panel and were secured by lock nuts and washers.

The magnetic cores were made from the soft-iron stationary contact posts of old magnetic contactors. Each core was ¾ in. in diameter, tapped and threaded on one end, and had a circular contact surface 1-in. in diameter on the other end. This contact provided a shoulder 3/16 in. thick on the end of each core.

The shoulders on both cores were carefully fitted to the inside diameter of the fiber tube and provided a means of maintaining alignment of the contacts within the tube at all times. A threaded shaft was fitted into the opposite end of each core and a flexible shunt was attached thereto with lock nuts. The shunts were extended through the insulating panel, and connections were made to the wing-nut terminals at the rear of the panel. Connections were made to the external circuit from the wing-nut terminals, which were marked with appropriate name plates on the front of the panel.

The contacts close when the current flowing in the coil produces enough magnetic force to pick up the lower core. This cur-

rent can be adjusted roughly by the tapped plate attached to the upper three turns of the coil. By inserting the "tap" screws in the threaded holes, one or two turns of the coil can be shunted out. In this manner a variation of approximately 33% may be obtained in the current required to close the contactor. In addition, an adjusting nut on the threaded shaft supports the lower core on the supporting bracket, and, by turning the nut, the core can be raised or lowered in the fiber tube, this providing a fine adjustment of the pick-up current.

The upper core is suspended in the tube and supported by the shunt terminal resting on the fiber end piece. The upper core is thus free to move upward under the impact of the lower core. This type of construction was adopted because earlier tests showed that with one core stationary there was a tendency to recoil or bounce under impact, which caused greater arcing and burning of the contacts.

Several combinations of contact material were used in the tests:

1. Coin silver to coin silver.
2. Silver graphalloy to coin silver.
3. Silver graphalloy to silver graphalloy.

In the tests made under actual operating conditions in the mines the silver-graphalloy to coin-silver contacts were used. Although all three combinations showed satisfactory non-welding characteristics, the silver graphalloy retained a smooth surface without evidence of burning or pitting.

Earlier Contactor Uses

The idea of the short-circuiting contactor is not new. A device of this kind has been manufactured and used for some time on high-voltage ac circuits. The following is quoted from literature of the manufacturer (Bulletin 1382, Railway & Industrial Engineering Co., Greensburg, Pa.).

"The line-shorting contactor was designed to provide fault-current interruption at a higher speed than could be realized by any practical form of circuit breaker by metallically short-circuiting the line voltage between the fault and the source of power. This action reduces the line voltage to zero on the faulted side of the line-shorting contactor, thereby immediately extinguishing all arcs."

Although this basic principle has been applied to some extent on low-voltage dc circuits, such as on electrified railroads, some thought that successful application to similar circuits in coal mines was doubtful. However, the experimental work and investigations of the author indicate otherwise.

What Happens in the Mines

To fully appreciate the problem of circuit protection in mechanized mining, it would be well to consider first the conditions usually prevailing when a fault occurs. In coal-mine service it is not uncommon to have poor voltage regulations, poorly maintained equipment or cables too small for the intended use. Consequently, it is not unusual to have cables conducting power to mobile equipment functioning at excessive temperatures.

This makes a conductor particularly vulnerable to forces that tend to change its normal position in the cable assembly relative to other conductors. In a two-conductor cable, dc flows in opposite directions in each conductor. Therefore, the magnetic fields around the conductors rotate in opposite directions. With current flowing during normal operation, the fields around the conductors are equal in intensity and opposite in direction. The magnetic lines of force follow a definite pattern in the space between the conductors, and a force is set up that tends to enlarge the space by pushing the conductors apart.

Arcing occurs as the conductors separate, increasing the resistance of the circuit and automatically reducing the current flow. As the current is reduced, the force acting on the contactors also is reduced. Thus, the length of such an arc will depend on the voltage of the circuit and mechanical resistance of the cable to the separation of its conductors. If the circuit is opened before the arc is stabilized, the time required to clear the circuit will also be a factor in determining the length of the arc.

When fuses are used in such a circuit, it is necessary that they have an appreciable time lag or excess capacity to avoid blowing fuses on current peaks normal to the operating cycle. Because of this, a fuse frequently will fail to open a trailing-cable circuit and clear the fault when a short circuit occurs, and the cable will be damaged badly before the circuit "burns clear."

Testing the Contactor

Before applying the short-circuiting contactor to dc feeders in coal mines, it was thought necessary to investigate the following:

1. Would it be possible to produce short circuits repeatedly with a contactor without welding or excessive burning of the contacts?
2. Would the contactor operate on high-speed split-second short circuits?
3. Would such a contactor operate successfully in the margin between normal operating-peak and short-circuit current values?

All of these questions were answered affirmatively by the following tests on a contactor designed by the author.

The contactor was assembled and mounted on a suitable panel and equipped with a fuse holder and fuse. The assembly used in the preliminary tests is shown in Fig. 3. It is similar to Fig. 1, except that one of the magnetic cores was stationary and the movable core was suspended on a spring at the top of the contactor. Also, the operating coil consisted of 58 turns of No. 12 solid-copper wire. Tests with this device were made at Kimberly mine of the Sloss-Sheffield Steel & Iron Co., Kimberly, Ala.

The device was set up in the dc substation on the surface, and power for the tests was obtained from the 250- to 275-v dc bus. The substation capacity was 300 kw, and the average load during the tests was approximately 500 amp. For estimating purposes the short-circuit current of an ordinary compound-wound dc generator can be taken as 10 times normal ("Selection and Application of Low-Voltage Air Circuit Breakers," Bulletin 4606, I-T-E Circuit Breaker Co.). This would mean an instantaneous current value at the generator terminals of approximately 10,000 amp or more, and it is safe to assume that this is somewhat higher than the maximum short-circuit current that might be obtained in the face regions of most coal mines under fault conditions.

The rate of rise of current for a standard 1,000-kw dc generator is given as 1,500,000 to 1,800,000 amp per second. This is probably somewhat higher than it would be for a 300-kw generator. However, the time required to reach the maximum value would in all probability be only a fraction of a second.

For these tests the contactor was connected to the bus by No. 2

Mine Tests Prove Basic Principles of Short-Circuiting Contactor

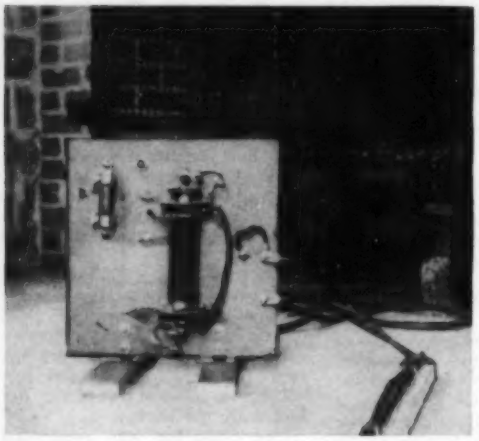


FIG. 3—CONTACTOR ASSEMBLY used in preliminary tests to determine operation under normal mining conditions.

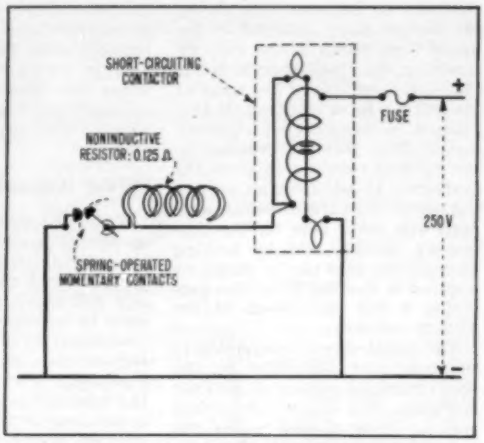


FIG. 4—TEST CIRCUIT simulating short-circuit conditions in a trailing cable.

B&S-gage flexible rubber-covered cables. Two No. 6 B&S-gage single-conductor rubber-covered solid-copper conductors were connected to the line side of the contactor panel, and this circuit was carried outside the building. Part of the circuit was mounted on a 1x2-in. wooden strip and fastened at 2-ft intervals to observe the effect of the magnetic field on the conductors.

Outside the building a pair of contacts was arranged to close with a tension spring. A small block of wood held the contacts open. By withdrawing the block with a wire attached to it a short circuit was initiated. A 60-amp renewable-link fuse was installed on the panel. Short circuits were initiated and the fuses were blown six times. A test was then made with a heavier current after installing two 60-amp links in the fuse holder. The potential at the bus during these tests was approximately 260 v.

Cores Redesigned

Examination of the contacts after this series of tests revealed very little evidence of burning or pitting. It was thought, however, that the solid contacts would result in some recoil or bounce when the contacts closed, with greater burning than would otherwise occur.

Accordingly, new cores smaller in diameter and lighter in weight were procured. The new cores were plated with coin silver to reduce contact resistance and improve the non-welding characteristics. Also, to eliminate recoil when the contacts closed, the cores were arranged so that both were movable and held apart by gravity rather than a spring, which tended to simplify the device further.

Twelve turns of flat copper "ribbon" were wound on the fiber core to replace the original winding. This made a coil equivalent in circular-mil area to No. 4 B&S-gage wire. On the basis of tests with the original winding the current required to close the contactor under the new conditions would be about 100 amp.

The second set of tests also was made at the Kimberly substation. The contactor was connected to the substation bus as in the first series, except that a cable nip equipped with a fuse was used to tap the positive bus. A 200-amp fuse was used and short circuits were initiated repeatedly. No tendency toward "sticking" of the contacts was evident.

In these tests displacement of the conductors on the outby side of the contactor was negligible. Later, when the contactor was made inoperative and the 200-amp fuse was blown directly by the created short circuit, the effect was to "bow out" the conductors noticeably between the points where they had been bound together. With the contactor operating the duration of the short-circuit on the load side was much shorter and destructive arcing was greatly reduced.

Testing Contactor Pick Up

Next, it was thought desirable to determine if the contactor would pick up on a fast momentary short circuit. For this purpose a steel-spring trap was equipped with a set of copper contacts and a flexible shunt. This device was so arranged in the circuit that when the trap was sprung the moving contact would brush past the stationary contact at high speed, creating a momentary short circuit and drawing an arc.

With this high-speed contact device initiating the short circuits, a series of tests were made in which 200-amp fuses were blown by the short-circuiting contactor. A piece of No. 12 solid-copper wire was substituted for the fuse in one test and the wire completely vaporized. A similar test was made in which the main circuit breaker on the generator panel was tripped through the short-circuiting contactor. The observed load on the circuit was only 300 amp when the short circuit was initiated. The circuit breaker was set to trip at 1,400 amp.

These tests were made by using butt contacts of coin silver and examination of the contacts afterward revealed some slight burning at the points. The contacts opened immediately after each test, indicating no difficulty from welding or sticking.

Similar tests were then made by using cores fitted with silver graphalloy contacts. Such material has ideal characteristics for this service, as the contacts showed no evidence of pitting or burning and retained their smooth surfaces. From these tests it appeared that the welding of contacts did not present a serious problem and that the device would operate with high

enough speed to be effective on momentary-contact short circuits.

Underground Service Tests

To test practicability in underground service it was necessary to modify the design of the contactor. New fiber end pieces were made and the contactor was mounted on an insulating panel, which in turn was mounted in a portable wooden box. Five turns of 1/0 B&S-gage solid-copper wire were used to form the series coil, and means for adjusting the amount of pick-up current was provided. The final design of the contactor for the underground tests is shown in Fig. 1.

After the contactor had been modified to meet the requirements of underground service some preliminary tests were made at the Kimberly substation to determine its new characteristics. After completion of these tests the contactor was placed in service at the Parrish mine, Railway Fuel Co., Parrish, Ala., in the circuit of a 14-BU Joy loading machine operating in 9th West entry, South Main.

The tests at Parrish mine were intended to determine whether the contactor could be adjusted so that it would not close on peak currents normal to the operating cycle, yet would close on high-speed momentary short circuits under normal voltages in the mine. This mine was selected for conducting the tests because the South Section had recently been mechanized but adequate feeders to supply power for the new equipment had not been installed. As a result, the voltages in this section of the mine were somewhat below normal.

To avoid possible delays in the operating cycle resulting from the contactor closing on normal peak currents, a small fuse was connected in the ground circuit between the contactor and the bonded track. This served to prevent blowing of the main fuse and interrupting service, while at the same time it would indicate if the contacts had closed. When the contactor had been adjusted so that it did not close on current peaks normal to the operating cycle, the connection to the bonded track was made solid. The contactor then remained in service under these conditions for 8 to 10 shifts, after which further tests were made.

Simulating Shorts

Although short circuits in trailing cables are common, a short circuit in an individual cable may not occur during many months of service. To expedite the tests, it was necessary, therefore, to simulate, as nearly as possible, conditions existing when a short circuit occurred in the cable in service. This was accomplished as follows:

A coil of wire of suitable length to provide a resistance of 0.125 ohms was wound noninductively on a tube of insulating material. This is equivalent to the resistance of approximately 300 ft of the No. 3 B&S-gage 2-conductor mining-machine cable which was used to conduct power to the loading machine at the time the tests were made. The contactor was then cut out of the machine circuit and connected in a circuit consisting of the contactor, noninductive resistor, high-speed contact making device, fused nip and the necessary connecting cables.

The electrical characteristics of this circuit closely resembled those of the cable connected to the loading machine. With the contactor still connected to the trolley wire and track at the same location, a series of tests were made by initiating short-circuits on the system with the high-speed momentary contact device. The contactor closed each time a short circuit was created and each time the fuse in the nip was blown. A 200-amp fuse was used in the nip during regular service of the loading machine and the same size of fuse was used in all short-circuit tests made at Parrish mine.

The tests indicated that the short-circuiting contactor could be used successfully where voltage conditions were lower than average. The tests further indicated that the device could be adjusted so that it would not close on peak currents normal to the operating cycle, yet would close immediately upon the occurrence of a high-speed momentary short circuit.

Lewisburg Tests

Additional tests were made at the Lewisburg (Ala.) mine of the Sloss-Sheffield Steel & Iron Co. At this mine the contactor was placed in the circuit to a Jeffrey 35-B shortwall mining machine in a manner similar to that shown in Fig. 2. This equipment was being used to drive a double-entry haulageway from the foot of the main haulage slope. The test was conducted approximately 6,000 ft from the nearest dc substation supplying power to the system. The entry faces were cut once on the day shift and once on the evening shift, and the contactor remained in service 4 weeks.

As at Parrish mine, the contactor was first connected in the circuit with a small fuse in the ground lead, or negative side of the circuit. This was to prevent delays that might be caused by the contactor closing on peak-load currents. When the contactor was properly adjusted, so that it did not close on normal operating peaks, the negative connection was made solid, and short-circuit tests similar to those at Parrish were made at Lewisburg.

At Lewisburg mine it was necessary to adjust the contactor for a higher peak current on the evening shift than on the day shift. This was thought to be a result of different voltages on the two shifts affecting the current peaks. With either setting, however, it was found that the contactor would close whenever a short circuit was created on the load side of the contactor and no difficulty was experienced in making the contactor function successfully on either shift.

In these tests the 0.125-ohm noninductively wound resistor was again used to simulate the resistance of the trailing cable. In this instance a No. 2 B&S-gage 2-conductor cable was being used, and the resistor was equivalent to approximately 378 ft of cable. The momentary contact device was connected in series with the resistor, as at Parrish mine. This circuit is illustrated in Fig. 4. A 250-amp fuse was used in these tests.

Fuse Tests

At Lewisburg mine tests were made to determine if a fuse would protect the circuit from such high-speed short circuits as had been used to close the contactor. For these tests the same circuit was used and the contactor was made inoperative. High-speed short circuits initiated by the momentary-contact device failed to blow the fuse. A 100-amp fuse was substituted for the original 250-amp unit and three such short circuits failed to blow it, although the attempts were made within an interval of a few minutes.

Upon completion of the tests at Lewisburg mine, the contacts were removed and examined. They were in excellent condition and apparently good for many more operations of the contactor. The silver graphalloy contact was as smooth and serviceable as when first installed.

DOUBLE-SHIFT LOADING AT FIDELITY has as its goal 4,000 extra tons with 55 extra men. This goal has been nearly achieved.

Double-Shift Strip Loading

Goals—Better Utilization of Equipment and Manpower
Examples—Buckheart and Fidelity, United Electric
Results—Major Savings in Service Labor

ALTHOUGH STRIPPING has traditionally been based on single-shift loading and preparation, there are a number of manifest advantages in double-shifting, including:

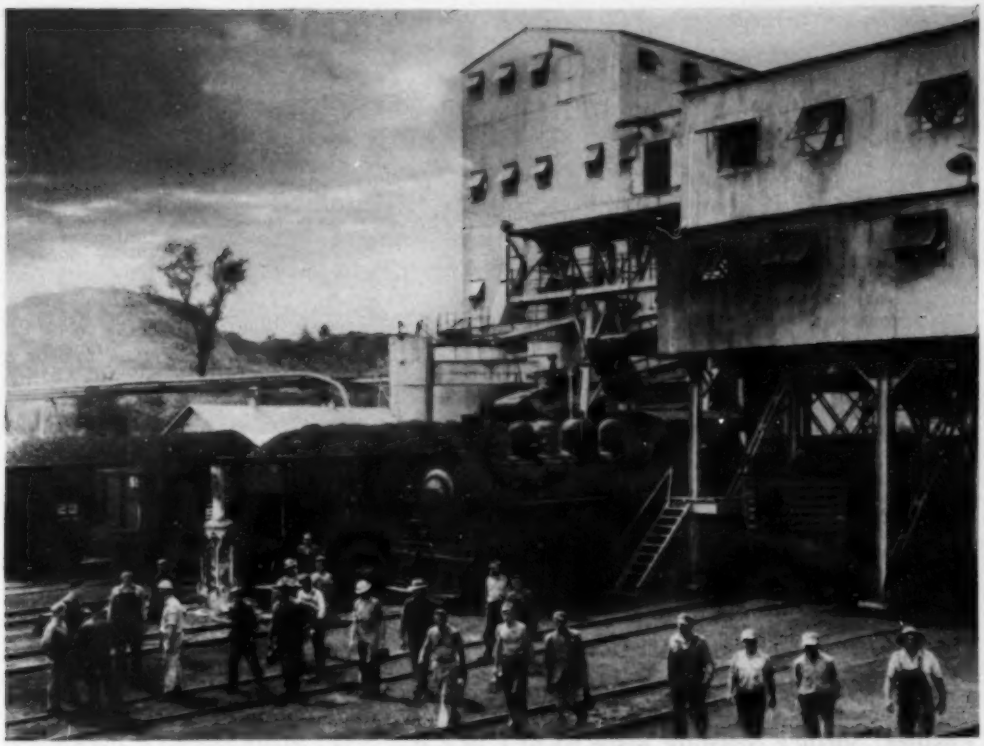
Better utilization of the investment in loading, haulage and preparation facilities.

Obviously, if stripping equipment must work at capacity to provide one shift of loading, double-shifting would require additional investment in stripping facilities and operating labor. This is a point emphasized by Frank L. Kolbe, president, United Electric Coal Cos., even though this organization, which has been double-shifting two of its properties in Illinois for up to 2 yr or more, has been able to do so without adding to stripping facilities already on hand. However, if extra stripping equipment and labor are required, the cost may be much less proportionally, still leaving a net gain.

• **Single-Shift Considerations** — Aside from tradition—in itself a powerful force for continuing on the old basis—major factors in sticking with single-shift loading involve both markets and equipment. Market conditions in the 30s for example, were such that there was little or no pressure for departing from normal one-shift practice. In addition, with the equipment then available for overburden preparation and stripping, there was relatively less opportunity for getting extra uncovering capacity at less than the going rate. Furthermore, available working time per shift was longer than at present.

Reserves available to a specific operation also enter into the picture, H. A. Reid, United Electric vice president in charge of operation, further points out. If the property has a short life expectancy, there is little to be gained by speeding up the rate of exhaustion, particularly if extra equipment and labor must be used to get the extra tonnage.

• **United Electric Goals**—Double-shift loading at the two United Electric properties started on the following dates: Buckheart mine, Canton, Ill., Feb. 10, 1949; Fidelity mine, Duquoin, Ill., Nov. 21, 1949. Goals were:



BETTER UTILIZATION of preparation facilities, such as the Buckheart plant shown here, is a major advantage of double-shift loading.

Buckheart, 3,000 extra tons with 49 extra men over the regular first-shift output of 4,500 tons with 158 men, including 56 men on maintenance work.

Fidelity, 4,000 extra tons with 55 extra men over the regular first-shift output of 7,000 tons with 285 men. This goal has been nearly attained. On Nov. 17, 1950, for example, first-shift output was 6,428 tons with 284 men, while second-shift output was 3,756 tons with 56 men. Among other things, this was in large part responsible for restoring the 1948-49 fiscal-year efficiency of 2.79 tons per man-hour, which had dropped to 2.68 in 1949-50. In 1941, in comparison, tons per man-hour at Fidelity was 2.11.

Buckheart, with somewhat longer experience and somewhat different equipment, has so far shown an even greater improvement. Tons per man-hour in the 1948-49 fiscal year was 3.58, dropping to 3.21 for 1949-50 and rebounding, by August, 1950, to 3.77. In comparison, tons per man-hour in 1940-41 was 3.41.

• **Preparation for Double-Shifting** —In going to double-shift loading United Electric management felt that it could be done with no additions to stripping equipment at Buckheart and Fidelity. Such has proved the case. At Buckheart, improvements in the wheel excavator already in service permitted uncovering the extra coal desired, while at Fidelity there was sufficient reserve in the standard units already on the property. Thus, it was only necessary to build up the working forces by the required number of men, plus the necessary extra supervision.

At Fidelity, as an example, additions to the supervisory staff consisted of an extra pit foreman, an extra foreman for the preparation plant, and an extra clerk. This also was the case at Buckheart. Maintenance of the preparation plant, and of the pit and haulage equipment used on the second shift, was pushed back to the third shift, with little change otherwise, except for appointment of an assistant superintendent in charge of maintenance. Master mechanics always had been employed, but creation of the new maintenance office has improved maintenance results.

Second-shift pit mining at Fidelity has been modified by reducing the number of loading shovels and trucks. On the first shift, 16 trucks and two loading shovels are operated. On the second shift, one loader and 10 trucks are operated, the aim being to match loading capacity with stripping capacity. In addition, loading is now done on a five instead of a six-day basis, thus economizing still more in loading and in preparation and maintenance labor.

• **Labor More Efficient** — Aside from a reduction in total number of men, United Electric experience indicates that personnel is more efficient with double-shift loading. The major saving from the labor standpoint is in maintenance and other service, though total maintenance is increased slightly. However, in terms of cost per ton, maintenance expense, and the expense for other service labor, is definitely down.

NEW HEAT DRIER reduces surface moisture in ¼x0 feed from centrifugal drier from 8 to 9 to 0 to 2% as desired.

ORIGINAL HEAT DRIER reduces surface moisture in ⅜x¼ feed after screen dewatering from 5 to 6 to 1 to 2%.

Fines Dried Efficiently

Equipment—New Updraft-Design Heat Drier Preceded by Centrifuge for Dewatering ¼x0

Results: Surface Moisture Reduced to 1 to 2%

AUGMENTING existing washing, screening and drying equipment, a new updraft-design reciprocating screen-type heat drier has proved itself in over a year's operation at the central preparation plant of the Northwestern Improvement Co., Roslyn, Wash. Although a property of the Northern Pacific Ry., the Roslyn mines are operated as commercial properties, in addition to supplying railway fuel, and the new up-draft drier has made possible a major improvement from the standpoints of moisture reduction, increase in Btu content of the product and resistance to freezing in handling and shipping during winter weather.

Operating on ¼x0 double-washed coal, first passed through a centrifugal dewatering unit, the new drier is adjusted to reduce surface moisture to 1 to 2% prior to remixing with other larger sizes after dewatering on screens and heat-drying.

Washing and Sizing

The N. W. I. central plant, with Harry Hill as foreman and Anthony Mattielli as coal analyst, operates on a minus 4-in feed

CLEAN SNOW around the plant indicates the efficiency of dust removal from drier exhaust.

CENTRAL-PLANT SUPERVISION is exercised by Harry Hill (right), foreman, and Anthony Mattielli, coal analyst.

PRELIMINARY DEWATERING for new heat drier is handled in 48-in centrifuge.

NEW FURNACE with spreader-type stokers supplies drying gases for new unit.

shipped in from the rough-cleaning and crushing plants at the mines by rail. In addition, the central plant is equipped to receive and handle mine-run directly from the outcrop strippings operated by the company. At the mine tipples, after hand-picking to remove coarse refuse, the coal is reduced to 4 in and loaded into railroad cars for movement to the central plant.

Built in 1935 and enlarged in 1937 and 1945, the N. W. I. central plant is equipped with Vissac jigs for primary cleaning, an N. W. I.-Elmore jig for retreating refuse and Deister Concentrator Diagonal-Deck tables for retreating ¼x0 from the primary washers.

To start the cleaning cycle, the raw coal is screened to the following sizes: 4x1⅝ egg, No. 1 jig; 1⅝x¾ nut, No. 2 jig; and ¾ minus, divided between Nos. 3 and 4 jigs. After dewatering on shaker-type equipment, the 4x1⅝ can be loaded directly or mixed. Normally, however, it is crushed to minus 1⅝.

Minus ¾ from Nos. 3 and 4 jigs is dewatered on vibrating screens, which take out the minus-¼ fraction. This latter goes to a table-feed distributor. The tables also receive the refuse from the Elmore rewash jig after reduction to minus ¼, as well as the fines from the original heat drier.

In rewashing, refuse larger than ¾ in. is crushed to that top size and is run with the natural ¾ minus to the Elmore unit. Some 8 to 10 tph is recovered in the rewashing process.

Drying ¾ x ¼

The original heat drier at the N.W.I. central plant, a Vissac Pulso downdraft unit, was installed in 1937 and is presently drying ¾x¼ to a surface moisture of approximately 2%, compared to a feed moisture of 5 to 7%. Maintenance has been low and heat is still supplied by the original furnace unit—a water-tube boiler with part of the tubes removed to prevent the boiler, which also supplies heating and process steam, from popping off when the furnace is supplying drying gases.

The fuel is ¾x0 with a Btu content, as fired with a ram stoker, of approximately 12,000. Consumption at a drying rate of approximately 45 tph is about 800 lb per hour. Gas temperatures are approximately as follows: inlet 650 F; outlet, at fan intake, 90 F. The exhaust fan, made at the mine, has been equipped with stainless-steel blades, and all the original steel ducts and stack handling the cool saturated gases have been replaced with concrete to reduce or eliminate corrosion.

Revisions in the drier itself have been limited largely to a new pulsator devised by Mr. Hill, somewhat larger and synchronized with deck motion—200 strokes per minute. The decks, 4x8 ft in size, are dressed with ½-mm stainless-steel wedge wire. To remove the fines passing through the wedge wire, a screw conveyor has been installed under the screens with much-more satisfactory results. The screw-conveyor product, as previously noted, is returned to the fine-coal circuit.

Drying Minus ¼

In the fine-coal drying circuit all minus-¼ coal and water is collected in a 10x10x105-ft concrete settling tank. From the tank it is discharged by the drag conveyor to a 48-in C-M-I continuous centrifugal drier. Water is added to the centrifugal feed, since it has been found that the additional water results in a better dewatering job. Surface moisture of the centrifugal product is 8 to 9%.

The new updraft drier, also a Vissac Pulso unit and the first installation in the United States, includes a single 6x12-ft deck presently jacketed with 1-mm wedge wire. It is planned to increase the openings to 1½ and possibly 2 mm to put more fines in the gas stream below the deck, where theoretically the operation is faster and more efficient. On the deck itself, at a feed rate of 45 tph, coal depth is approximately 1 to 1½ in. Even feeding and spreading of the coal over the entire deck surface is assured by a screw-type distributor, with the spirals on one side throwing to that side, and the spirals on the other pitched the opposite direction to cover the other half of the deck—unbalanced deck motion, 220 strokes per minute, compensated by heavy coil springs.

Rated capacity of the unit is 35 tph, but, as noted, it handles 45 tph easily and with equal results. Normally, the ¼x0 feed to the unit is dried to 1 to 2% surface moisture, compared to 8 to 9% in the input to the unit. On this basis, fuel use is around 800 lb per hour.

The furnace to serve the new unit, as well as the unit itself, was built by the N. W. I. staff. A. P. Green plastic firebrick is used in the furnace, which has a steel shell and is equipped with two Hoffman Firite spreader stokers, also fired with ¾x0. Drying gases are circulated by a Western Blower fan rated at 41,500 cfm, 6-in static pressure, 525 F, 3,000-ft altitude. The exhaust fan is Sturtevant Size 9 unit, originally employed with air-cleaning equipment.

Input temperature to the drier varies from 450 to 700 F, as desired; outlet, 150 to 250, averaging 200 F. Fines in the exhaust gases are removed in two 7-ft specially designed cyclones and returned to the final mixing and distributing conveyor. Maintenance to date has been practically nil.

Photos By Fraley, Christopher Coal Co.

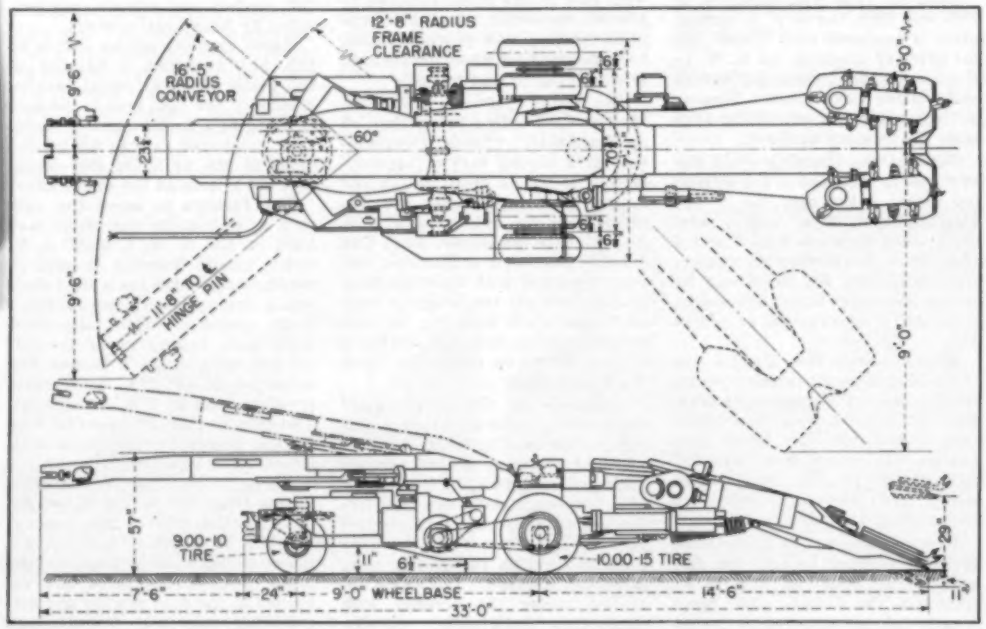
CONVERTED LOADER IN ACTION—weight on the four front tires is 19 tons and 4 tons on the rear dual caster wheels. Shift production with the rubber-tired units is about 26.6 tons per man in the section.

Converted Loaders 50% Better

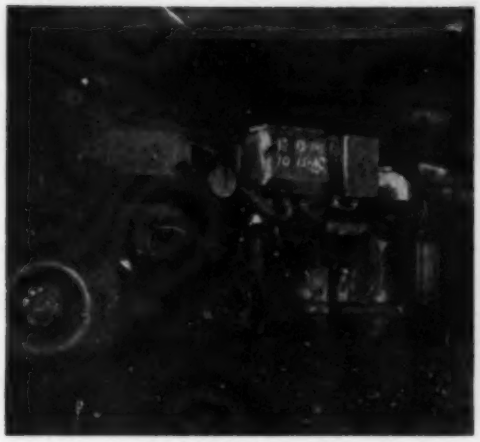
Converting Track Machines to Rubber Tires Raises Output 50% and Saves Heavy Investment

Three-Point Suspension Includes Caster Wheels at Rear

AN INCREASE of nearly 50% in production per unit has followed a redesign project involving changing track-mounted loaders to rubber-tired units at mines of the



CONVERSION RESULTS—how the track loader looked after installation of rubber tires.



CONVERSION INCLUDED THREE-POINT SUSPENSION, with drive on the dual front wheels through sprockets between the wheels.

DUAL CASTER WHEELS support the rear end and do the steering. They were installed in the space formerly occupied by the cable reel.

Christopher Coal Co. Div., Pittsburgh Consolidation Coal Co., Morgantown, W. Va. By this change, which permits off-track mining, the company is keeping up in the competition for greater efficiency without writing off a heavy investment in existing machines.

Background factors were these: Arkwright No. 1 mine, the largest producer of the company's six operations and the one with a complete new outside plant (*Coal Age*, December, 1949), was operating with track-mounted equipment while off-track loading machines in other mines of the company were showing higher efficiency.

Production at Booth No. 6 mine, operated with off-track equipment (*Coal Age*, September, 1949), was changed to mining old workings where shuttle cars no longer would be practical. Consequently, six Joy 10SC shuttle cars, three Joy-Sullivan 10RU cutters and three Joy 10SC loaders were transferred to Arkwright in exchange for track equipment consisting of Goodman 460 loaders, Jeffrey 29U cutters and gathering locomotives.

• **Conversion Planning and Results**—The schedule for Arkwright called for working four sections with two loaders per section. Five more loaders were needed. Therefore, it was decided to buy four new 11BU machines and convert one of the two 460's remaining at Arkwright to rubber tires.

Officials of the coal company worked out a general plan for the conversion and then commissioned the Lee-Norse Co., Charleroi, Pa., to make the detailed design. A machine was shipped to that company and E. M. Arentzen, president, gave it his personal attention. In a comparatively short time the converted machine was shipped back to Arkwright for a trial, which began March 20, 1950, two weeks after the first off-track section was started in that mine.

Arkwright works three shifts and ships 5,200 tons of clean coal per day after rejecting about 8% in preparation. Machine-shift production for rubber-tired units is approximately 450 tons, or approximately 26.6 tons per man in the section. Before the conversion, and when the entire mine was on track equipment, the comparative figures were 300 and 22.2 tons.

Shuttle cars carrying 6 tons (clean coal) discharge directly into 354-cu ft mine cars. The coal, Pittsburgh seam, is shot with permissible. Holes are put in with hand-held drills. Some of the roof is held by timbering installed with timbering machines, some with timbering set by hand, and some with roof bolts.

• **How Conversion Was Handled**—The converted Type 460 machine, as shown in the accompanying drawing and photographs, rests on three sets of dual wheels. There are two sets at the front in fixed alignment outside of the frame. A third set is mounted caster-fashion at the rear. Front tires are 16-ply 10:00x15-in; rear, 20-ply 9:00x10-in. Drive to the front dual wheels is accomplished by roller chains to sprockets mounted between tires. A differential is included in the drive arrangement.

All steering is done with the rear, or caster, wheels, which are pivoted by hydraulic power. This caster-wheel arrangement was put into the space originally occupied by a cable reel, which was dispensed with.

Weight distribution is approximately 19 tons on the front wheels and 4 tons on the caster wheels. Overall height of the machine is 57 in; width, 7 ft 11 in; road clearance, 6½ in. The center line of the front wheel is 14 ft 6 in from the extreme front end of the gathering head. The wheel base is 9 ft. The vertical shaft, or pivot pin, of the caster is 9 ft 6 in from the rear end of the loading boom. Total length of the machine was not changed from that of the original 33 ft.

• **Experience Good** — As track equipment, the Goodman 460 had proved its efficiency to company officials from the standpoints of loading ability and low maintenance. The swinging head and the digging chain operated through the "buster" clutch are considered features of special merit.

Experience with the converted Goodman 460 machine in Arkwright No. 1 has been so favorable that the company is having Lee-Norse convert seven for Osage No. 3 and, in addition, may convert three for Booth No. 6 in 1951. These conversions will be approximately 4 in lower and the boom will be shortened somewhat.

EQUIPMENT AND METHODS coordinated with the seasons beat winter water problems in stripping. Typical terrain is shown at the left, with track leading from the tipple into the pit. At the right, bulldozers push topsoil to start a new cut.

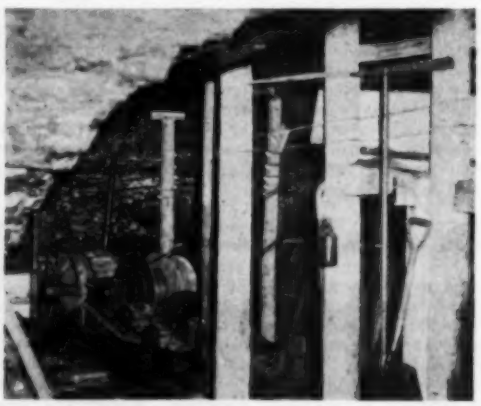
Stripping Waterlogged Valleys

Summer Stripping and Winter Loading Coordinated to Meet Winter Water Problems at Tono Mine Efficient Underground Recovery of Old Pillars Based on Special Scraper Units and Semi-Longwall

By WARREN E. CRANE, Seattle, Wash.

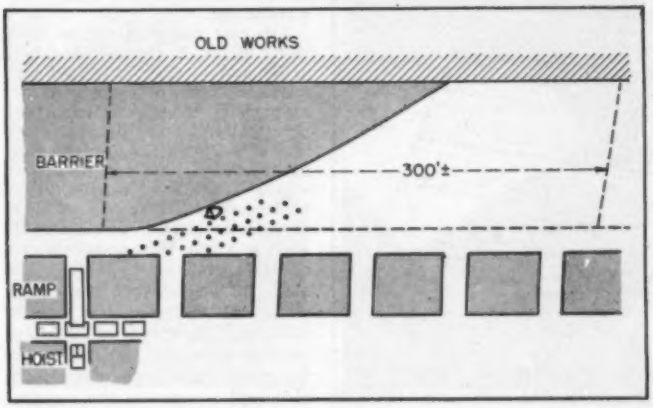
"STRIP" STRIPPING with a dragline, bulldozers and scraper is the method devised by the Strain Coal Company, Seattle, Washington, for the recovery of coal in stream valleys at its Tono mine, Centralia, Thurston County, Wash., approximately 100 mi south of Seattle. Heavy rainfall in the area was responsible, first, for leaving coal in these valleys in the original deep mining and, second, for the choice of equipment and methods used in present-day stripping.

Tono mine was purchased by the Strain organization, headed by William Strain, from the Washington Union Coal Co., which originally operated it to produce locomotive fuel by underground methods. Tono, like several other properties in the past, was taken over with the idea of adjusting the original basis of operation to meet



SCRAPERS WERE EMPLOYED UNDERGROUND to recover old barrier pillars. Left is the scraper operating on a semi-longwall face. At the right is the mine-built hoist pulling the scoop up a timber ramp to discharge the coal to the cars.

DRAGLINE (left) digging down to the coal after the bulldozers. A truck-mounted drill (right) is employed for drilling a shale stratum between the coal and the overlying blue clay to permit spoiling with the dragline.



TONO SCRAPER-MINING SYSTEM efficiently recovers old barrier pillars. Output per man on the face crew averaged 30 tons per shift.

the new marketing situation that has faced the coal industry in the past 25 yr.

• **Oil Restricts Markets**—In the State of Washington, and in other Pacific Coast areas, the advent of oil competition in the railroad and several industrial fields took place much earlier than elsewhere in the United States as a result of importation from California during the period of flush production in that state, supplemented by the low cost of tanker transportation up the Coast. Consequently, it has been necessary to find a new basis of operation. In this, the utilization of high-speed motor trucks, both around the mines and on the highways for the transportation of both raw and prepared coal, has played a major part, along with the recent development of stripping, in contributing substantially toward lowered costs.

On this basis, the Strain organization has mined at one time or another in most of the major producing areas in Washington, adding stripping to its arsenal in 1939. With changing market conditions and the exhaustion of minerals, operations are now restricted to Tono, although other workings are being maintained in a stand-by state so that they can be quickly brought back into production if market conditions warrant. The company's dormant Newcastle mine, at Renton, in King County, approximately 20 mi from Seattle, is an example.

• **In operating the Tono property,** scraper mining underground and stripping on the surface have been called upon to offset high labor costs and to improve the product's competitive position since the property was acquired. Operations at the mine are under the direct supervision of Clyde Colwell.

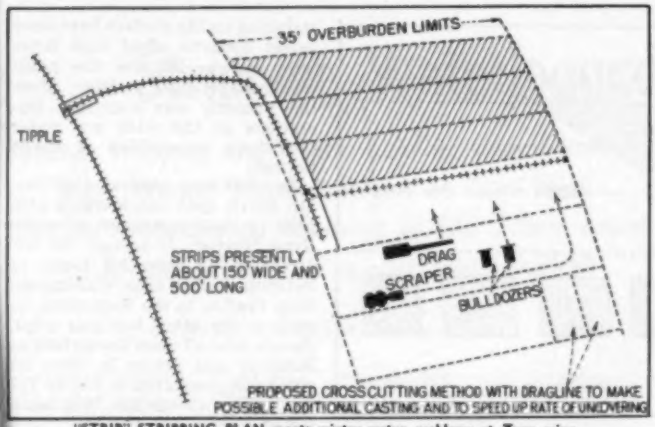
In exercising general direction, Mr. Strain gets considerable help from a four-passenger all-metal Ryan Navion. It is used by Mr. Strain to fly from his home in Bellevue, across Lake Washington from Seattle, to the Tono mine, as well as for other business trips. He can take off from the airfield at Bellevue and arrive in Tono 35 min later, compared to 2½ hr for the trip by automobile. For landing at Tono, a turf strip is provided adjacent to the mine office.

Scraper Mining Underground

The underground workings at Tono Mine—in the Tono No. 1 seam, approximately 17 ft thick—consist primarily of barriers with some remaining virgin coal reserves. Of the coal seam height, some 6 to 7 ft is left up for roof protection. The mined area is in the shape of an elongated basin with an average dip toward the center of 4 deg.

The mining problem was one of extracting these barrier pillars, plus certain small areas of virgin coal, by a system of loading sufficiently flexible and mobile to provide rapid extraction from sections containing relatively small tonnages and relatively difficult of access. The solution was the

LOADING in Tono pit (left). The crew includes (right) Bill Auer, dragline operator, and Percy Emmons, timekeeper.


35' OVERBURDEN LIMITS
TIPPLE
STRIPS PRESENTLY ABOUT 150' WIDE AND 500' LONG
DRAG SCRAPER
BULLDOZERS
PROPOSED CROSS CUTTING METHOD WITH DRAGLINE TO MAKE POSSIBLE ADDITIONAL CASTING AND TO SPEED UP RATE OF UNCOVERING

"STRIP" STRIPPING PLAN meets winter water problems at Tono mine.

development of scrapper equipment and a semi-longwall mining plan.

• **The scraper sets consist** of 1½-yd Sauerman buckets powered by mine-built double-drum hoists. The hoists were made from shaker-conveyor drivers to which were added double logging-type drums with friction clutches. Power was supplied by 40-hp motors and each drum has a capacity of about 350 ft of rope.

The hoists normally were set in crosscuts between the main haulageway and the airway on the side of the haulageway opposite the barrier pillar being moved. A ramp through the crosscut on an angle of approximately 25 deg elevated the scraper buckets to the height necessary to discharge into the mine cars, which were pulled under the ramp by a small auxiliary hoist installed for that use.

Pillars were extracted in sections approximately 300 ft long by slabbing them in fan-shaped fashion, starting on the rib of the airway and working back to the old rooms. By constantly slabbing the rear end of the face ahead of the section next to the ramp, the line of the face was turned, in fan-shaped fashion, almost 90 deg, so that at the end, the scraper was pulling nearly in line with the ramp, instead of at right angles.

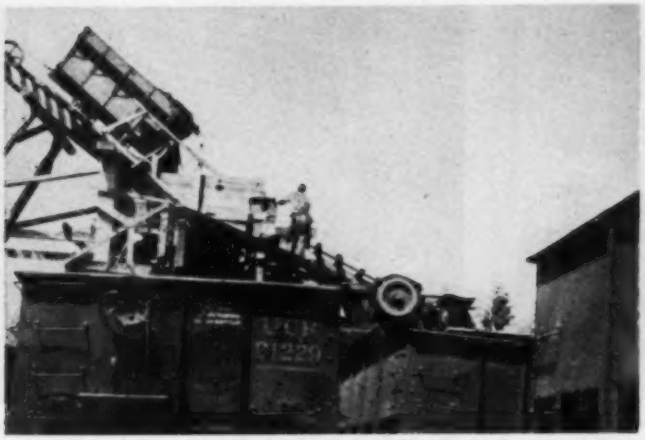
• **Average recovery was approximately 80%.** Production per man on the crew averaged 17 tons per shift. Production per face crew—hoistman, auxiliary hoistman and helper—averaged 30 tons per day. Shooting and timbering with single posts was done on the night shift, along with dismounting, moving and rebuilding of ramps as the succeeding areas were worked out.

The coal was shot off the solid, using Black & Decker hand-held drills and du Pont Monobel permissible. Lump recovery was not a primary consideration, since practically the entire production is sold in stoker sizes. Holes normally were drilled 6 ft deep, providing a break of 5 to 6 ft for loading after timber was set along the face as close as possible while leaving a travelway for the scraper. The faces were ellied slightly to make the bucket stay in the coal, while the tail rope was carried back and anchored by overhead sheaves normally fastened in the top coal. Planks along the props also kept scraper in the required path and prevented coal from being pushed back into the gob.

The scraper outfits also were used to some extent for driving headings to recover certain small areas of virgin coal. However, productivity was substantially less and they were used primarily because they were on hand.

Valley Stripping

As is usually the case, a considerable amount of coal was left along the outcrop in deep mining at Tono. This was particularly true where the underground workings crossed the valleys between the rolling hills comprising the terrain. Invariably, when the depth of cover dropped to 35 ft, no pillars were removed and, in many instances, only a haulageway and an airway were driven across the valley to reach the coal in the next hill. One reason for this was the



RAIL CARS loaded by the shovel are hoisted up an incline to dump into the preparation plant.

TONO PREPARATION includes hand picking of lump (left) and crushing to augment stoker.

necessity for protection against the possibility of flooding through caves during the periods of heavy rainfall characteristic of the country.

At first, it was assumed that stripping would be difficult because of the waterlogged condition of the valleys. It has been found, however, that the overburden consists mainly of a tough blue clay which can be readily handled by a dragline provided the streams are diverted by ditches.

• **Shipping and loading equipment at Tono** consists of a 2-yd Northwest dragline with an 85-ft boom, a ½-yd Northwest loading shovel, a Caterpillar D-8 14-yd scraper, plus bulldozers and other auxiliary equipment, including a B-27 Mobile Drilling Co., track-mounted vertical auger for drilling a shale stratum between the coal and the overlying blue clay. Over the blue clay is 8 to 10 ft of good soil adapted to bulldozer and scraper removal.

Overburden removal is primarily a summer job, although the dragline can be employed in the wet season provided mats are used. The coal is mined in strips 100 to 150 ft wide and approximately 500 ft long at nearly right angles across the valley as shown in the accompanying diagram. With the addition of the scraper, strips approximately 150 ft. wide are now being mined, compared with approximately 100 ft with the dragline and bulldozers used in the initial operations.

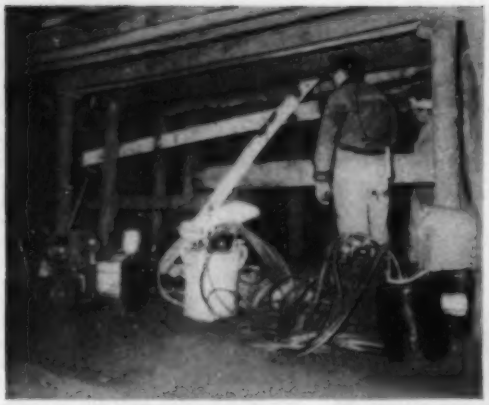
• **Mining is done step by step** and the goal of the management is to uncover a sufficient quantity of coal during the dry summer season for continuous loading at a rate of approximately 300 tons per day during the winter run. Originally, the overburden was removed in two successive operations: (1) bulldozing of the top soil into the old pit to the maximum extent possible, followed by (2) casting and recasting of the remainder down to the coal by the dragline. This was necessary because, with the boom length available, the dragline was limited to a cut of approximately 65 ft wide.

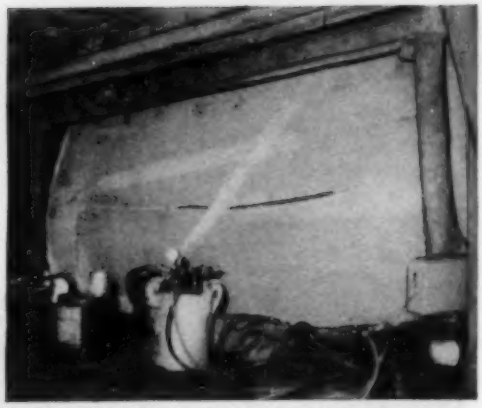
Now, as soon as conditions permit in the spring, the bulldozers are started, pushing the top soil across the strip into the old pit. Next the dragline starts to dig down for the coal about 75 ft wide, casting the spoil into the old pit. Finally, at the back of the new strip, the scraper starts pulling down the line and then across the end of the old pit. The use of the scraper permitted an increase of approximately 50 ft in strip width.

The coal is loaded into a rail car consisting of a pit car built up to a capacity of approximately 6½ tons. Originally, it was hoisted to the tipple, located on the railroad in approximately the position shown in the accompanying diagrammatic sketch. Now, after several strips have been mined, a small gasoline locomotive is used to move the car from the loading point to the foot of the incline. Rail haulage was adopted because it simplifies the problem of getting the coal up to the necessary height over the railroad tracks and because it presents fewer difficulties in wet weather than truck haulage.

• **Preparation at Tono** consists of screening, hand-picking of the larger sizes and crushing to augment the company's stoker output. Loading is done on two trucks. At the top of the hoist, the loading car dumps into a small hopper from which the coal passes to a screen making lump, stoker coal and a minus-¼ dust. The latter is discarded as a rule because it normally contains a large percentage of fine dirt and soil washed down into the pit.

As a result of the Strain policy of coordinating operations with marketing and competitive conditions and its persistent drive for a low cost of operation, large tonnages of coal have been recovered that might otherwise have been lost, thereby serving the interests of conservation. Emphasis on efficiency in 1949 resulted in an output of 9.33 tons per man day compared to an average of 3.83 for the State of Washington as a whole.





STOPPING CONSTRUCTION, showing how plastic film can be used with a minimum of framing. At the left is the frame for a temporary stopping; right shows cheesecloth being installed as a base for the film; opposite page, completed stopping ready for service.

Air Losses Cut and Roof and Ribs Protected by . . .

Sealing With Plastic Film

Material—Sprayable Plastic Film Applied Over Cloth

Applications—Sealing and Repairing Stoppings; Sealing Mine Roof and Ribs

Results—Major Reductions in Air Loss and Spalling of Mine Roof and Ribs

By O. C. PRICKETT

President, Columbia Sales Corp., Pittsburgh, Pa.

PLASTIC FILM—a wartime derivative—now offers coal-mine operators a new cost-cutting weapon. Applied to either temporary or permanent stoppings, or to roof and ribs, the plastic film (a) practically eliminates air losses and (b) protects haulage and ventilating openings against spalling and disintegration. To date, these conclusions are being borne out in applications in West Virginia, Illinois and Pennsylvania.

The material—Cocoon, manufactured by the R. M. Hollingshead Corp., Camden, N. J.—is a vinyl-plastic film developed for use in atomic-energy research laboratories as a protective film against powerful acids, corrosion and radioactive contamination. Using standard pressure-spraying equipment, it is applied over an adhesive compound both in ventilation and in anti-spalling work.

Application for the control of air losses is as follows:

• **Temporary Stoppings** — After the normal brattice-cloth stopping has been erected, the edges and the adjoining roof, ribs and floor are sprayed with the adhesive. Immediately after this first thin coat is applied, the regular plastic coating is sprayed over the adhesive and brattice cloth, forming a tough, durable, moisture- and acidproof film. This film is flexible enough to take air shocks and normal abuse, while still providing a tight seal that prevents any air losses through the completed plastic stopping.

Application time and cost for an area of approximately 100 sq ft perhaps are best indicated by figures covering a recent application in West Virginia. The opening was 7 ft 2 in high with an average width of 14 ft. H. D. brattice spads were placed on about 24-in centers top and bottom and 18 in on the ribs.

1.3 man-hours erecting cloth stopping at $14.75 per day, 7-hr working time	$ 2.74
12 sq yd brattice cloth at $0.45 per yd.	5.40
26 spads and nails at $0.014 per set	0.37
1.2 man-hours spraying adhesive and film (including setting up and taking down equipment	2.53
4½ gal plastic film at $3.10 per gal	13.95
½ gal adhesive at $3.50 per gal	1.75
Total cost of stopping...	$26.74

Other recent figures indicate that the cost of sealing alone averages 16c per sq ft for cloth stoppings.

• **Permanent Stoppings** — Where permanent stoppings are necessary, roof support and long life are provided by using tile, brick, cinder or concrete blocks, and masonry. Preventing leakage in this type of stopping is a major problem. Plastic film provides the answer.

If concrete blocks are used, for example, they are laid up dry and wedged in the usual manner. Then the edges are caulked with cheesecloth or used brattice cloth. Next, the entire wall is sprayed with the

COMPLETED TEMPORARY STOPPING with minimum framing shown on the opposite page. Air pressure is toward the observer.

adhesive compound, which dries slowly. A single thickness of cheesecloth is then pressed into the wet compound at several points in much the same manner as wallpaper is hung. The cloth is extended beyond the blocks onto the ribs, roof and bottom, closing over the area previously caulked.

Application of adhesive and vinyl-plastic then takes place the same as with a temporary stopping. The cheesecloth prevents the film from sticking to the blocks, thus permitting the film to be stripped off and the blocks to be used again, if desired. Because of the elasticity of the plastic film, permanent stoppings erected in this manner do not develop fissures and cracks from ordinary roof and rib pressures.

• **Reclaimed Stoppings** — When block-type permanent stoppings are re-erected, the blocks are again set up dry. New cheesecloth and plastic film are applied as previously outlined. In this manner permanent stoppings are easily reclaimed and re-erected many times.

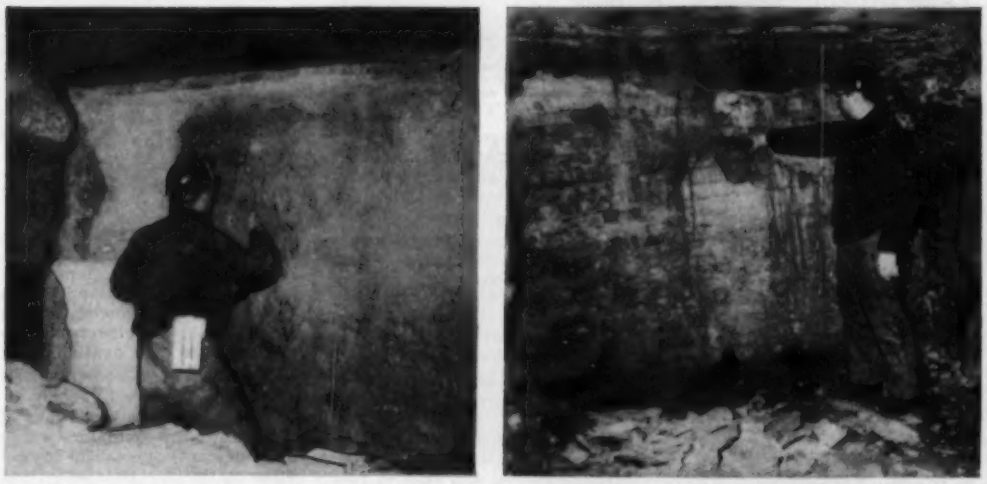
• **Stopping and Overcast Repair** —Versatile vinyl-plastic film also lends itself to the repair of cracked or broken stoppings and overcasts. The first step is to spray the area with adhesive compound. Next, the plastic film is sprayed over the adhesive, and the broken or cracked wall is as efficient as the day it was built.

Where large holes or breaks are encountered, they may be stuffed with any handy substance, such as rags or old brattice cloth. Then the job is completed by spraying adhesive and film in the regular manner.

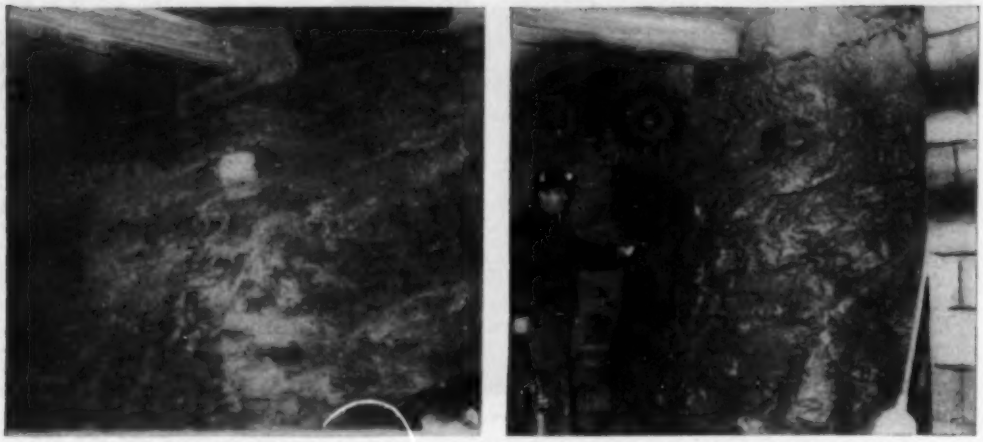
• **How Air Losses Are Reduced**— Even under average conditions, at least 60% of the air entering a mine should reach the last crosscut—preferably more for maximum efficiency and lowest-cost ventilation, as well as for better working conditions at the face. In many mines the percentage is as low as 30% to 40% as a result of leakage at stoppings, overcasts and doors.

As an example of how sealing with plastic can reduce leakage, the following was achieved recently in a West Virginia mine. The length of the aircourse from the fan to the last crosscut is 3½ mi. Air at fan was 70,000 cfm. Average air reaching last crosscut was 33,000 cfm. Starting at that crosscut and working back toward the fan, 210 permanent stoppings (cement blocks laid in and faced with ½ in of mortar) were sprayed with adhesive and plastic. The reading at the crosscut after spraying was 50,000 cfm. Thus, the loss was reduced 46%.

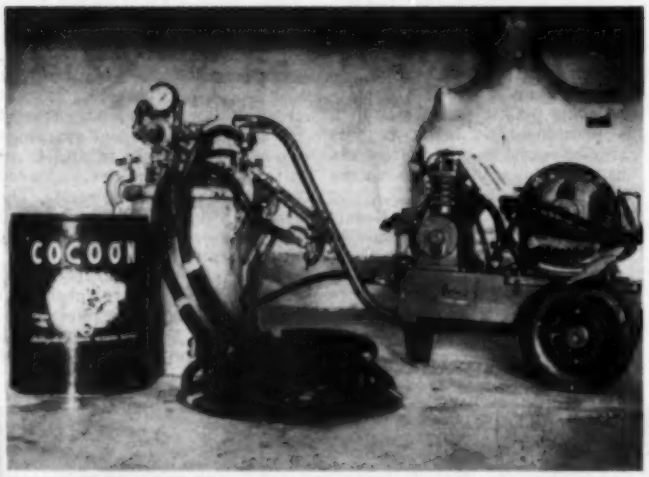
Power waste as a result of leakage losses can be very substantial in a year. The cost of electricity, at 1½c per kilowatt-hour, for a 150-hp motor supplying 250,000



STOPPING REPAIR with plastic film. At the left, cheesecloth has been applied to crushed stopping, with the plaster broken off, and spraying is being done. Illustration at the right shows repair of a break in a brick stopping. Roof was sealed at the same time.



SEALING ROOF AND RIBS, showing, in these views, rock rib before sealing (left) and sealing completed back to man (right).



COMPLETE SEALING UNIT—tank, gun, hose, compressor and material.

cfm on a 24-hr 7-day basis will average $14,640 per year. Projected on a 250,000-cfm load, the benefits of the spraying job previously cited would work out to $3,660 per year in power for one fan.

Results to date with plastic film indicate that such losses can be reduced to a point where 75% or more of the air put into the mine will reach the last crosscut. In fact, as far as individual stoppings are concerned—regardless of their type—losses can be reduced to practically zero.

When coupled with overhauling of ventilating equipment to achieve maximum efficiency in moving air, the continued use of plastic film on brattice cloth, cement block and other stopping materials, and in repairing broken and cracked overcasts, will show substantial savings, not only in power for ventilation, but in materials and labor for controlling and conducting the air to point of use. Also, the ground will be laid for the quality and quantity of air necessary for maintaining a healthful working atmosphere at the face and for diluting and rendering harmless all noxious and explosive gases liberated in the mine.

• **Sealing Roof and Ribs**—Work to date has been successful in preventing spalling and falls of roof and ribs in haulageways and airways by excluding air and moisture. For example, a slate roof that was constantly developing falls was sealed during the summer months. During these months the roof was completely covered with a film of water from condensation. Application of the adhesive expelled the water and left a dry surface. This surface was then completely sealed with vinyl-plastic, leaving a tough, elastic film that moisture and air could not penetrate. This work has successfully withstood the rigors of both summer and winter weather and there has been no further spalling or falls.

Cost of labor and material in the early stages with a green crew, including sealing of roof, was $0.168 per square foot.

• **Training and Equipment** — Standard pressure-spray equipment is used including a lightweight two-wheeled portable compressor. The equipment and materials have been designed and packaged so that application can be made along main haulageways without interfering with normal mine operation.

Training men in the application of vinyl-plastic film requires but one day. Care and maintenance of the equipment and all application procedures are taught at no charge. Trained engineers and application men are available for consultation in the field upon request.

Through the development of vinyl-plastic for coal mines a step forward has been taken toward better control and maintenance of ventilating systems and the sealing of mine roofs and ribs.

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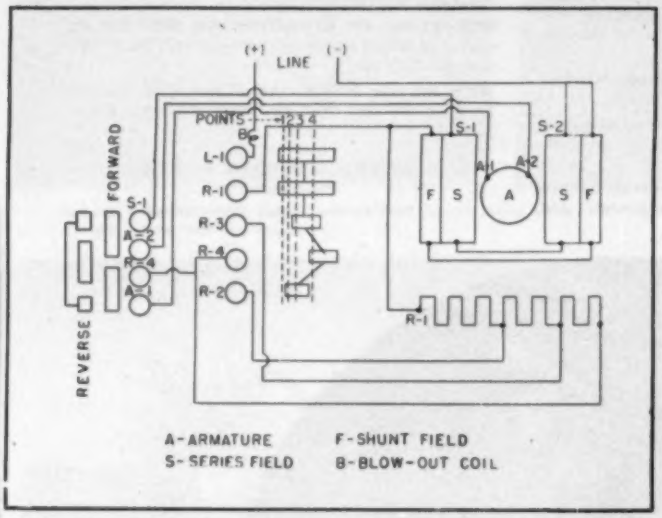


FIG. 1—SCHEMATIC DIAGRAM of cutting-machine circuits shows how drum controller is wired for three control functions, adjustable speed, forward or reverse operation and resistance starting.

The Drum Controller . . . What It Is and What It Does

Production Supervisors Can Help Boost Efficiency of Machine Mining by Striking an Acquaintance With Electrical Equipment and Prints—Better Maintenance and Quicker Repairs Will Result From Your Study

PRODUCTION FOREMEN, though not directly concerned with the intricacies of electrical circuits, may find themselves in a position to give advice that will prevent an interruption from becoming a breakdown. A working knowledge of electrical prints also will permit a foreman to provide adequate information to the maintenance department when he finds it necessary to call for aid.

If you have little interest in things electrical we think you will agree that what follows is a legitimate observation. You could have eliminated a lot of the down-time charged to machines in your section if you had been able to inform the master mechanic of the source of trouble and the parts and tools needed to cure it. He would have known who and what to send the first time. Also, operator maintenance would be improved if you knew what is required to keep certain parts operating at top efficiency, because you would be able to check on the operator's performance of first echelon maintenance.

If you have avoided electrical prints because of their complicated appearance, may we suggest that with the aid of a good book or the assistance of the master mechanic at your mine you diligently apply yourself to studying simple diagrams. You soon will find that you have a desire and ability to understand more complicated prints, and your job performance and value to your company will rise accordingly.

Coal-mining applications of certain electric-powered machines require that such machines be designed for adjustable speed, forward and reverse operation and stepped-resistance starting to protect large high-inertia armatures from the damaging effects of excessive current surges. In certain machines, such as cutting machines, mine locomotives and high-capacity scraper loaders, the control center must be under the hand of an individual operator, and he must control the machine functions in the simplest possible manner.

All these functions are accomplished by the drum controller. Here is how one type of drum controller works.

Fig. 1 is a schematic diagram of a controller commonly used on shortwall cutting machines. Controllers on such machines are required to satisfy three functions, adjustable speed, to and fro operation and resistance starting.

As shown in the diagram, the controller consists of a set of stationary contacting fingers corresponding to a set of conducting segments which are fixed to a rotatable cylinder. In Fig. 1, as in other drum controller diagrams, the segment cylinder is shown as it would appear if it were unrolled onto a flat surface.

To enter this print, or any other, find the line leads or power path to the machine. They are the lines marked (+) and (—) in Fig. 1, and they represent the trailing cable of the machine. The positive lead connects to the top finger of the controller and the negative lead to one terminal of the series field. Trace this latter lead through the series field and observe that it finally connects to Finger S-1 on the reversing drum, which is an auxiliary to the main drum. When the handle of the reversing drum has been set to provide forward operation, the segments labeled forward will be in contact with the fingers of the reversing drum.

At the reversing drum the current will "flow" from Finger S-1 through the segment into Finger A-2, which is one terminal of the armature cir-

B.F.Goodrich

How BFG tires turned coal's top inch from dust to clean profit!

STRIP miners know that cleaning the coal seam after the stripping shovel has finished its job is often a dirty and wasteful operation. Before small shovels can begin removing the coal, the common practice has been to doze away the dirt left by the big shovel with crawler-type tractors. But the steel tracks of such equipment chew up the top inch of coal. This coal, in turn, blows about — leaving a black badge on men, machinery and equipment that represents lost profit.

Here's how the collieries operating the mine shown above turned this top inch of coal into clean profit. The light tractor, equipped with B. F. Goodrich Tractor-Grader Lug Type tires, replaced the heavy dozer. Because these tires have a tread especially designed to give super traction even when working under light equipment, the job was done faster and cleaner . . . without the waste of the top inch of coal. In addition, the superintendent reports that this fast-moving unit makes it possible to work right up next to the huge shovel bucket — saving time, and that means profit.

This is a small, but interesting example of how B. F. Goodrich gives greater service to operators of off-the-road equipment. BFG offers a special tread design for every job to be done. Only BFG has the patented *nylon shock shield*, the exclusive plus factor that practically eliminates bruise breaks that result in time loss and costly replacement. A layer of nylon cord is built in between the tread and body plies to shield the cord body. In tires for heavier service, there is a *double nylon shock shield* to smoothly distribute impacts and strains.

Next time you buy tires, see your B. F. Goodrich dealer. Specify B. F. Goodrich tires for your new equipment and enjoy the profits of longer service and greater traction. *The B.F.Goodrich Company, Akron, Ohio.*

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

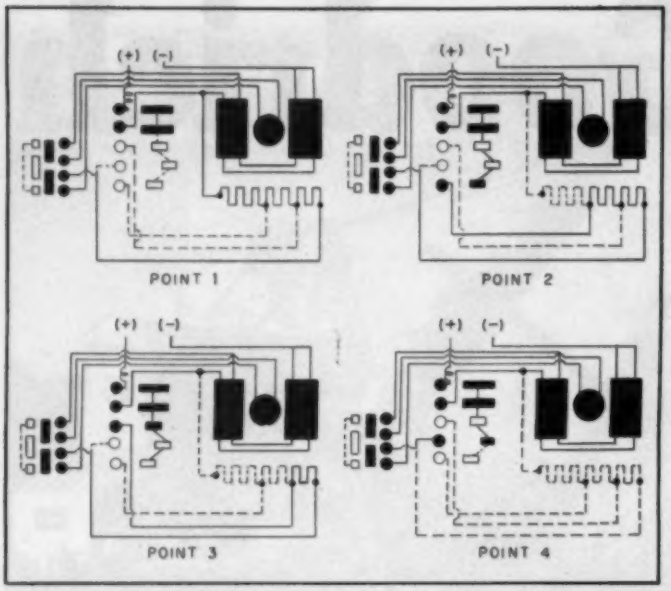


FIG. 2—ENERGIZED CIRCUITS at each controller point show how starting resistance is progressively short-circuited to accelerate motor.

cuit. From Finger A-2 on the reversing drum trace the circuit back through the armature, out of the armature at Brush A-1 and back to Finger A-1 on the reversing drum. Current passes from Finger A-1 to Finger R-4 through the segment on the reversing drum.

At this point the controls are set for forward motion, and the armature and series-field circuits are closed. The motor will operate as soon as power from the line is applied, and this is done by turning the main controller handle to the first point. Those segments of the main controller cylinder that are crossed by the dotted line, 1, will be in contact with corresponding fingers.

The solid line connecting the drum segments indicates that current can pass through the cylinder on which the segments are mounted, the cylinder being insulated from the shaft that supports it. So, Finger L-1 will contact the top segment and Finger R-1 will contact the next lower segment. There is no other contact at Point 1.

Here is a description of the completed circuit with the controlled handle at Point 1. The line lead to Finger L-1 is feeding power to the top segment on the controller cylinder, which feeds the next lower segment through the body of the cylinder as shown by the solid line connecting the segments. The latter segment is in contact with Finger R-1, thus energizing the shunt field and closing the starting-resistance circuit through Finger R-4 on the reversing drum. The motor now is running with all starting resistance in series with the armature. By reducing the line voltage, the starting resistance protects the armature windings from damage that would occur if full line voltage was applied to the standing armature.

However as the motor gains speed it builds up back voltage or counter-electromotive-force, which limits the effective voltage at the armature by opposing the applied line voltage. As more speed is desired it is necessary to cut out of the armature circuit a portion of the starting resistance. Reduced resistance in the armature circuit permits more of the line voltage to act at the brushes, thus causing the motor to increase its speed. Of course higher motor speed results in another increase in back voltage, which limits the maximum possible speed for that particular controller setting.

Subsequent increases in speed require that additional portions of the starting resistance be removed from the armature circuit. These reductions in starting resistance are accomplished by the drum controller as the handle is turned from one point to the next.

Fig. 2 shows energized portions of the control and power circuits as the controller is turned to successive points. Solid lines and blackened fingers and segments indicate energized conductors, while dotted lines and outlined fingers and segments indicate non-current-carrying elements. In Fig. 2 the reversing drum is set for forward operation.

The blow-out coil is a magnetic feature of the controller which provides a magnetic field through the gap as as a finger breaks contact with a segment. The magnetic lines of force extinguish the arc formed when the contact is broken to minimize the burning effect of such an arc on the contact surfaces. The blow-out coil is inserted in a part of the circuit that is always energized when the motor is operating, usually in the line lead to the controller.

An additional arc-suppressor is the insulating shield which separates fingers and segments from those above and below. In some controllers the blow-out coil is mounted on the insulating shield, which is the part that must be turned out of the way to permit finger-and-segment maintenance and replacement.

The drum controller shown in the illustrations is relatively simple; however, it does contain the basic elements required in a drum controller that will provide the control functions previously mentioned. Refinements and additional elements would be required in a locomotive controller because of greater service demands and the increased number of control functions to be satisfied. For instance, in locomotives multiple motors are the rule, progressive series-parallel operation may be desired and dynamic braking may be included.

These functions require an increased number of elements in the controller, but the fundamental principles remain unchanged. It still is a manually operated set of switches for selecting circuits that will provide desired motor performance.

Added fingers and segments will direct power to added motors, a redesigned main drum will permit progressive series-parallel operation and, for dynamic braking, changes in the reversing drum will control short circuiting of the armatures through suitable resistance.

With regard to drum controller maintenance, requirements are relatively simple. They are (1) cleanliness, (2) periodic adjustment of fingers to maintain proper contact pressure and (3) frequent lubrication of contact surfaces of fingers and segments with petroleum jelly.

What Is a Safe Mine?

SAFETY in a mine depends upon the way you think. If you think safety, chances are better than 100 to 1 that you will work safely.

A first-aid chest, guards enclosing moving machinery, mine laws, and such are all good, but they cannot make a mine safe. A safe mine must have more than all these—every mine-worker receptive to and enthusiastic about everything that will prevent injuries and death.

When everyone knows what to do, the correct way to do it, is able to do it that way and has the determination to do the job only by following the safe way—then and not until then will we have a safe mine.

—*The Westmoreland News*

"We will sign it with our name"

Few things in life are as precious to a man as his name. He bestows it with pride on his heirs. He does not sign it lightly. To the man of integrity, his signature is not so much a means of identification as an evidence of good faith.

When the Jenkins brothers were satisfied they had made the best valve money could buy, they *signed* it with their name. Today, as for over three quarters of a century, that signature — forming, with the famous Diamond, the Jenkins trade mark — is more than a symbol of the maker's pride in his craftsmanship. It is the mark of a friend you can trust.

Jenkins Bros., 100 Park Avenue, New York 17. Jenkins Bros., Ltd., Montreal.

Operating Ideas

Shuttle-Car Reel and Spooler Change Reduces Delays

(Photo by Praley, Christopher Coal Co.)

WITH THE SPOOLING DEVICE shifted to a position below the reel, the trailing cable on this shuttle car no longer tears down brattice cloth in the Arkwright mine.

NO MORE BRATTICE CLOTH torn down, no fouling and damaging of guide mechanisms by brattice cloth, elimination of cable pinching, and a back-spooling action as good or better, are the results of changes to the cable reel and spooling device on 6½-ton Joy 10SC shuttle cars in the Arkwright No. I mine of the Christopher Coal Co., Morgantown, W. Va. The change has greatly reduced shuttle-car delays.

Rotation direction of the reel was reversed and the reel was raised 2 in to make room for changing the spooling device from the top to bottom. Protector flanges were added so that the cable cannot be pinched between the car frame and a rib corner at a narrow intersection.

The accompanying photograph shows the first car changed. The work was done in the Arkwright shop, at a cost of approximately $150. Eleven additional cars have been so modified, but with some details improved over the car shown.

Mine-Developed Method of Filling Oil Reservoirs Cuts Down Time for Continuous Mining Machines

CONSIDERABLE ADDED OPERATING TIME has been gained for Joy continuous miners at the Mech Mining Co., Kittanning, Pa., by a new method of filling the main oil reservoirs devised by Walter L. Yeager, assistant foreman.

As a result, it is no longer necessary to pull the machine back from the face to refill the reservoir and the time saving has totalled at least 30 min. per miner every 24 hr., or a net gain of approximately 20 tons of coal per unit. Experience has shown that more satisfactory operation of the entire hydraulic system also results, because operators have found it easier to maintain oil in the reservoir at the proper level.

Since the coal seam varies from 38 to 48 in. in height, it formerly was frequently necessary to tram the miner back from the face and cut a hole in the roof to provide sufficient clearance for transferring oil from the container to the reservoir. This required up to 45 min. per miner every 24 hr of operation, or a production loss of approximately 30 tons per unit. In addition, it was necessary to clean up and gob the rock and boney cut from the roof before mining could be resumed.

Various methods were devised and tested before the following method was finally accepted and installed on all miners. First, the short suction hose between the reservoir and pump was removed and discarded. The iron-pipe fitting in the reservoir was removed and replaced with a special hydraulic adapter of the proper size. A new suction hose, 48 in long and equipped with swivel couplings, then was installed between the reservoir and pump. A strainer to be attached to the end of the hose and a cap to be screwed on the adapter in the reservoir complete the device.

Filling procedure is very simple. First, the suction hose is removed from the reservoir and the cap installed on the adapter. Then the strainer is attached to the free end of the hose and inserted into the oil container. When the pump motor is started, the pump will pick up oil from the container and pump it directly into the main-return circuit of the hydraulic system. In this manner, 5 gal of oil can be transferred in about 1½ min, and very little oil is lost when the cap is removed and the hose re-attached to the reservoir.

MAYBE YOU WERE only doing your job when you developed that good "Operating Idea" recently, but that's no reason you should hesitate to tell COAL AGE. We'll pay cash for it, too. **See the notice on p 113.**

ONLY 1 SET OF BATTERIES

FOR TWO-SHIFT SHUTTLE CAR OPERATIONS

Battery-powered shuttle cars have the following advantages demonstrated and proved:

SAFETY
Only battery cars are "permissible"

PRODUCTION
Can produce 10% more tonnage
Deliver more tons per man shift
Give 22% more ton-miles per shuttle car hour

PERFORMANCE
Include all design advances
Travel 25% faster
Discharge 30% faster
Are more dependable and predictable
Handle supplies easier
Reduce shuttle car change time
Can gob underground
Promote section efficiency

COST
Equal capital cost
Produce coal in shuttle car sections for approximately ½c less per ton**
—in hand-loaded sections, as much as 75c a ton

**Shuttle Car Haulage, AIME, Technical Publication No. 2192.

A "MUST" FOR CONTINUOUS MINING MACHINES

Battery-powered shuttle cars enable continuous mining machines to work 10% more of the shift.

AND . . .

Two-shift operation is now possible with only one set of batteries.

GOULD

STORAGE BATTERIES

THIS PORTABLE CAGE AND HOIST, mounted on a special trailer and truck, make every shaft a potential escapeway.

THE GASOLINE-DRIVEN emergency hoist and portable cage use the headframe and sheave left at an outlying air shaft.

Portable Cage and Hoist Turn Air Shafts Into Escapeways

WITH FOUR of the 14 shafts at Rosita No. 6 coal mine equipped with escape ladders or stairs, a portable hoist and portable cage have been assembled and are kept in readiness to make every shaft a potential escapeway.

The hoist, powered by a gasoline engine, is permanently mounted on a motor truck, which also tows a special trailer carrying the cage. The cage, which can accommodate four men wearing oxygen-breathing apparatus, is round and is pointed at the top and bottom so that it will not catch on obstructions in or around the shaft. The steel headframes and sheaves used in sinking the shafts are left in place to be available for emergency hoisting. The several outlying shafts are for ventilation and their diameters measure 6, 7 and 8 ft.

Rosita No. 6 in the state of Coahuila, Mexico, is operated by Cia. Carbonifera de Sabinas, S. A., a subsidiary of the American Smelting & Refining Co. The emergency portable hoisting outfit was described in a paper presented at the 1950 meeting of the Kentucky Mining Institute by Karl Marshall, director of safety for the mine, in which he reported on the sealing of a fire in the mine and the reopening of the sealed area some 6 mo later.

Barneys Increase Trip-Handling Efficiency

BARNEY-TYPE CAR HAULS installed in 1940 have proved the most-successful and trouble-free method of handling empty and loaded cars on the tipple at No. 3 mine of the Northwestern Improvement Co., Roslyn, Wash.

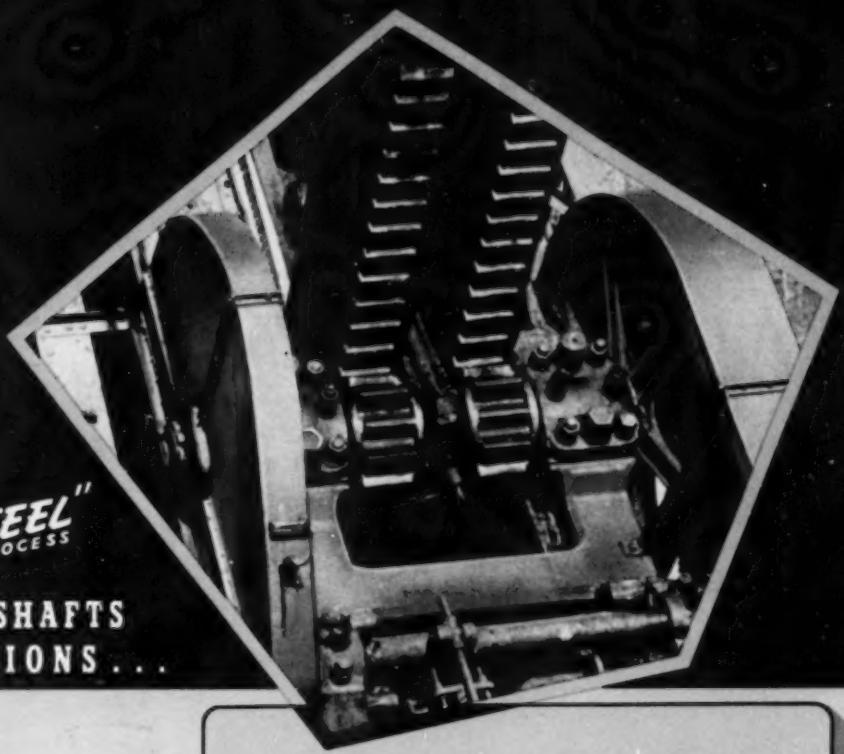
After major difficulties with chain-type feeding equipment, the first barney installation was made on the loaded side at No. 3 tipple. Normal trip size during the day is 18 cars and the original equipment failed in the chain-links, which proved too small to handle the load. Now, 54 cars can be started and pulled even when frozen solid, as is frequently the case in the winter season. Double dogs on the barneys prevent more than half-a-car rollback in handling trips. On empty trips, the dog generally catches the second car. On loaded trips, the barney usually hooks on the 4th or 5th car.

The barneys operate on narrow-gage tracks installed in the center of the regular tracks and are pulled back and forth by wire ropes. The power unit in the original installation for handling loads was made with double drums with a jaw clutch between them. The pulling drum is a 3½-ft unit with a 10-in face, while the rewind drum is an old 6-ft sheave with a brake block on the top to hold the rope in place. The clutch is moved back and forth through a link mechanism from a lever on the tipple deck. Electrical contacts on the link mechanism automatically reverse the direction of the 20-hp motor when the clutch is shifted.

The pulling rope on the small drum is 200 ft of 1-in regular-lay plow-steel rope. The rewind rope is ½-in.

The power unit for handling empties is a Whiting-style double-drum unit fitted with ⅝-in rope. It is driven by a 20-hp motor through V-belts. Cars from the kickback dump are coupled into trips of 18 and then are pulled 180 ft over a knuckle from which they run by gravity down a 1.4% grade 700 ft to the main slope, where they are picked up by the main slope hoist. Limit switches on both the old and new power units control the distance traveled in either direction. On the loaded unit, rope life is about 1 yr; empty unit, 2 yr.

KNUCKLE leading to the empty storage track with barney on narrow-gage track in the center. The Whiting-style power unit is underneath the track. Dogs in the foreground hold the empty trip until the barney can come back and hook on underneath.



"TOOL STEEL" PROCESS

SHIPPER SHAFTS AND PINIONS...

Provide

DELTA COLLIERIES

division of AYRSHIRE with LONGER LIFE! LOWER MAINTENANCE!

"Tool Steel" splined shipper shaft pinions have outlasted competitive pinions by at least **2 to 1** in the same service!

The "Tool Steel" shaft itself is still in good operating condition and indications are that it will finally show the same outstanding performance.

"Tool Steel" materials supplied on Delta's latest order include not only a shipper shaft and pinions but also the two mating racks.

WE GUARANTEE our products to give sufficient life over any other grade of hardened material operating in the same service to cover any difference in first cost. If our material fails to fulfill this guarantee, we will make good the deficiency in either cash or new material.

THIS GUARANTEE WAS ORIGINATED BY AND IS EXCLUSIVE WITH THE TOOL STEEL GEAR AND PINION CO.

HERE'S DELTA COLLIERIES' COMPARISON:

	"TOOL STEEL" SHIPPER SHAFT PINIONS	COMPETITIVE PINIONS
SERVICE LIFE:	24 Months	12 Months (Maximum)

After **24 months** of continuous service the **"Tool Steel"** splined shipper shaft is still in good operating condition.

The shovel on which these records were established strips an average of 4,200,000 cubic yards per year.

This service life can be equalled by no other products!

Write today for complete information.

"TOOL STEEL" PROCESS

The Standard of Quality

for GEARS • PINIONS • SPROCKETS • WHEELS *and other* HARDENED PRODUCTS

THE TOOL STEEL GEAR & PINION CO.

CINCINNATI 16, OHIO, U.S.A.

IT CAN'T TALK BUT IT SAYS PLAINLY

"Here's good rope"

In almost every line of industry there are certain trademarks that automatically suggest good merchandise.

We feel that this can truly be said of the Bethlehem reel, which is actually the trademark of Bethlehem wire rope. Our aim is, and always has been, to produce the finest wire rope that anyone can make.

How well have we succeeded in this effort?

The answer lies in the mines, in the oil fields, and other places where wire rope gets the roughest, toughest usage. The men who run the hoists, the drilling rigs, the shovels and cranes—they're the ones who can tell you.

"Bethlehem?" they'll say. "It's good rope. It sticks with you."

That sums up pretty well, we think, what the Bethlehem reel has always implied.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

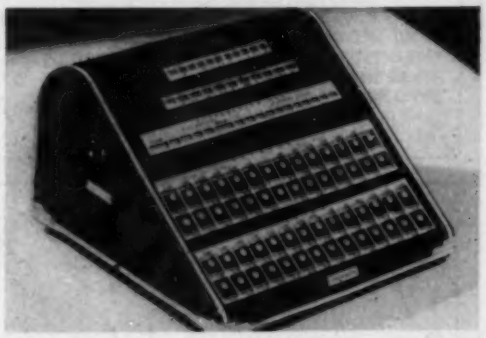
When you think WIRE ROPE . . . think BETHLEHEM

"Chart Calculator" Instantly Shows Payroll Costs

THE CURRENT-MODEL "Multi-Chart Calculator" is one of the simplest and speediest methods available for determining payroll costs and deductions, says its developer, M. I. Jackson, accountant, Black Band Coal Co., Olcott, W. Va.

By merely turning the knobs at the side of the calculator, the user instantly has visible in the windows accurate wage calculations at various hourly rates from ¼ hr to a full shift, and at day rates from 1 to 100 days for both standard time and overtime. Other rows of windows, similarly operated, show coal loading by the ton, withholding and Social Security deductions and cubic feet of coal reduced to amount, pounds and tons at a given price and tare. When changes in wage scales or deductions require revision of the figures, new charts may be inserted in a matter of seconds. The unit weighs less than 1 lb and is made of lightweight reinforced cardboard that is durable but easy to handle.

The calculator illustrated, on which Mr. Jackson has applied for a patent, took first prize in the Miners' Exhibit held at the Southern Appalachian Industrial Exhibit in Bluefield, W. Va., last August. Since he exhibited his first model at the Bluefield Coal Show in 1948 (*Coal Age*, October, 1948, p 122), Mr. Jackson has worked on the unit to develop it to its present high standard of utility. While he started out to develop the calculator primarily for his own use, he has built copies for various acquaintances who saw the calculator and recognized its time-saving possibilities. He hopes to arrange for its manufacture in the near future.



HOURLY AND DAILY WAGES, withholding taxes and other figures are instantly visible when knobs are turned on this "calculator."

Halftrack Makes Utility Unit

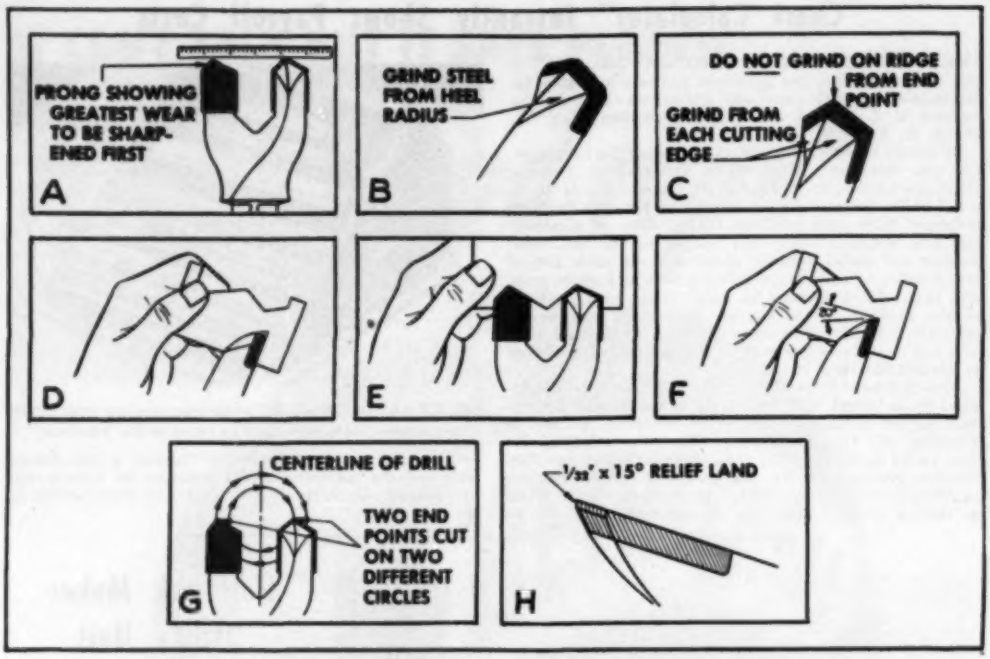
FITTED WITH a telescopic boom held in an A-frame with telescopic legs, the halftrack service unit shown in the accompanying illustration finds constant use in a variety of ways at the Chieftain No. 20 preparation plant of the Maumee Collieries Co., Riley, Ind. Lifting power is provided by the winch on the front end, modified to permit carrying the rope back over a mast immediately ahead of the driver's seat. Boom and A-frame legs are made of pipe. The legs are provided with pins to permit lowering and raising the boom, which also is provided with a telescoping section and pin for changing the length to suit the job being done. Loads can be carried, if desired, on the rear platform.

"Home-Made" Drill Rig for Roof-Bolting

THIS DRILL STAND, designed and constructed in the shop of the Keen Mountain mine of the Red Jacket Coal Corp., Red Jacket, W. Va., saves time and a lot of manual energy in drilling holes for roof-bolting. Built especially to eliminate the laborious job of manually supporting the drill in one section of the mine where the roof is being bolted, the rig also might be useful at smaller mines which cannot afford the high-priced machinery used in roof-bolting at the larger mines, Red Jacket officials point out in discussing the rig.

The unit is made of angle irons welded together to form a frame that supports the drill and permits it to be moved up and down on guides by a wire rope attached to a hand wheel on the right side. An enclosed switch on the left side controls the power to operate the drill. The entire rig is mounted on rubber tires for easy maneuverability.

To operate the drill, the hand wheel is turned until the drill steel is against the roof in the proper place and the power turned on. During drilling, the drill steel is kept against the end of the hole by continued turning of the hand wheel. After the hole is completed, the weight of the drill will pull the drill steel out of the hole.



How to Sharpen Carbide-Tipped Auger Drills

AUGER DRILLS—like all other carbide-tipped coal-mining tools—should be sharpened before they become excessively dull if easier drilling and longer tool life is to be assured, suggests the Carboloy Co., Detroit 32. The company recommends the following procedure for sharpening auger drills, along with the general grinding suggestions contained in the first of this series ("How to Sharpen Carbide-Tipped Cutter Bits," December *Coal Age*, p. 109):

1. Determine which of the two prongs on the auger drill shows the most wear (A above). Sharpen this prong first; then grind down the other prong to the same length.

2. On the first prong, grind steel from the heel radius (B) with an aluminum-oxide wheel. Amount of steel to be removed is determined by the amount of carbide to be removed. (A silicon-carbide wheel is used for grinding the carbide tip; the aluminum-oxide wheel is used only for the steel shank.)

3. Grind first from one cutting edge and then from the other on the same prong (C). These two radial surfaces meet to form a ridge from the end point to the base of the prong. Never grind directly on the ridge itself.

4. When grinding, use an up-and-down rolling motion. Apply moderate pressure on the upward swing, starting just below the carbide tip and with one of the two cutting edges aligned with the face of the wheel.

5. Grind the heel radius so that it is the same as it was when the tool was new (D). Smaller clearance on the heel causes dragging. Greater clearance weakens the drill.

6. Now determine which of the two cutting edges on the "shorter" prong shows the greater wear (E). Sharpen this edge first, then the other, maintaining correct cutting-edge angles and distances of end point from the outer edge.

7. Grind a 20-deg clearance on the tip (F), blending it into the heel radius to conform with the original shape of the drill.

8. Now grind the cutting edges on the other prong, following the procedure above. Grind the second prong to equal length and same proportions as the first. End points on the two prongs should cut on different circles for maximum performance, as shown in G.

9. If the drill is to be used in hard formations, grind a 1/32-in x 15-deg relief land on each cutting edge of both prongs (H).

How to Get More Tire Mileage From Diesel Trucks

"DRIVE-WHEEL TIRES will and do give just as much mileage on a diesel truck as they will on a gasoline-powered truck of comparable horsepower rating if drivers are taught to handle the truck properly and use—not abuse—the great amount of power that is available at comparatively low engine speeds," says J. A. Beckett, manager field service and engineering, General Tire & Rubber Co., Akron. Mr. Beckett's suggestions for proper diesel operation are based on an extensive study of diesel tire mileage.

As shown in Fig. 1, a 160-hp gasoline engine develops 75 hp at 1,000 rpm the usual take-off speed for a loaded truck of this size, while a 160-hp diesel engine develops 105 hp, or 40% more. At the same speed, the gasoline engine develops 360-ft-lb torque (Fig. 2), while the comparable diesel develops 540 ft-lb torque, an increase of 50%.

Consequently, the driver who races a diesel engine in starting or accelerates too much or too fast before shifting to a higher gear is wasting fuel, shortening engine life and wasting

(*Continued on page 113*)

Get a higher percentage of salable coal from your raw feed. At many mines, close to 100% recovery is being obtained day after day with the aid of the Chance Process. Being a "heavy density" sand flotation process, the gravity of the medium can be so accurately regulated that "near gravity" separation may be obtained. The Chance Process also gives you:

Dependable performance — steady, uniform, trouble-proof operation. Specific gravity of mixture remains constant; efficiency of separation is unaffected by fluctuating loads or changing qualities of coal.

High degree of flexibility — ability to handle coal at operating gravities from 1.35 to 1.65, with size range as wide as 10" x ¼" to one washing unit.

Easy operation — change-over from one washing gravity to another can be made in five minutes, simply by opening or closing valves . . . all under one-man control.

Increase your tonnage of shipping-grade coal, with the help of the Chance Process. Our engineers will be glad to cooperate with you in solving any of your coal-cleaning problems.

CHANCE PROCESS

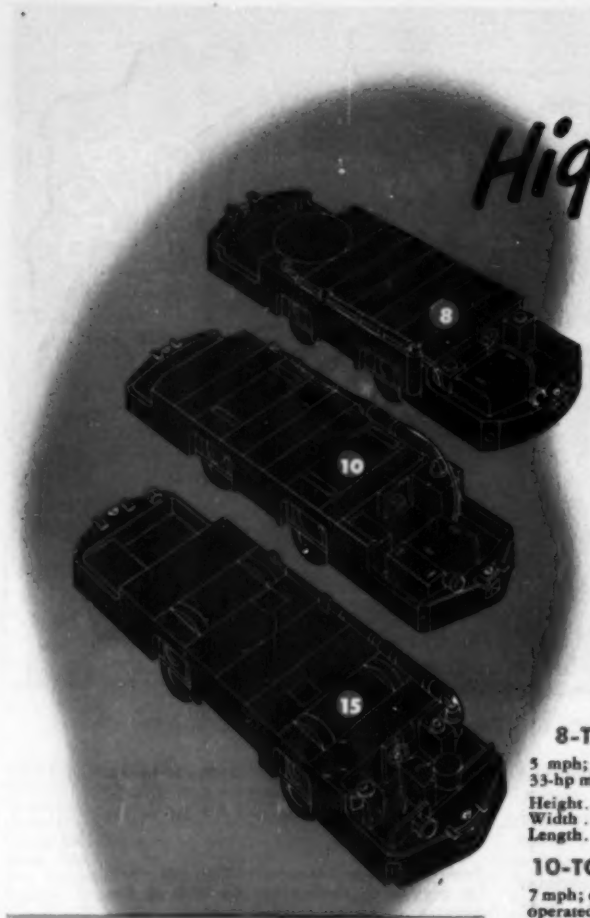
the heart of the preparation plant

NEW YORK 17 PHILADELPHIA 5 CHICAGO

WITH A BACKGROUND OF OVER SIXTY YEARS' EXPERIENCE

High-Tonnage Haulage

FROM LOW VEINS



The Low-Vein Triplets Get More Low Coal Per Hour

The *26" over-all height* of these Westinghouse Triplets speeds high-tonnage output from low seams . . . reduces unproductive "top pulling". Flat top affords high visibility. Special design features assure maximum operating efficiency . . . more time in service . . . more coal per hour. Thus, operating profits are greatly increased.

Select the Triplet best suited to your needs:

8-TON "IN THE ROOM"

5 mph; cam contactor controller; gearless cable reel; two 33-hp motors.

Height	26"	Gauge	44"
Width	69"	Wheel Base	56"
Length	16' 8"	Wheel Diameter	24"

10-TON "FLATROADER"

7 mph; cam contactor controller; two 60-hp motors; can be operated in tandem. Optional "extras" include air brakes, air control and other "big locomotive" features.

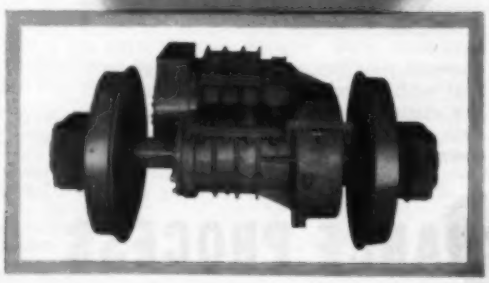
Height	26"	Gauge	48"
Width	73½"	Wheel Base	52"
Length	16' 3½"	Wheel Diameter	25"

15-TON "MAIN HAULAGE"

9 mph; electropneumatic control; two 90-hp motors; can be operated in tandem.

Height	26"	Gauge	44"
Width	78½"	Wheel Base	85"
Length	21' 2"	Wheel Diameter	24"

For further information, call your Westinghouse representative, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-15160



What Makes the Low-Liner Low

Small diameter motors with parallel spur gearing mounted in a common casting—plus smaller wheels—cut over-all height to a new 26" low for haulage locomotives.

YOU CAN BE SURE . . . IF IT'S

Westinghouse

MINE LOCOMOTIVES

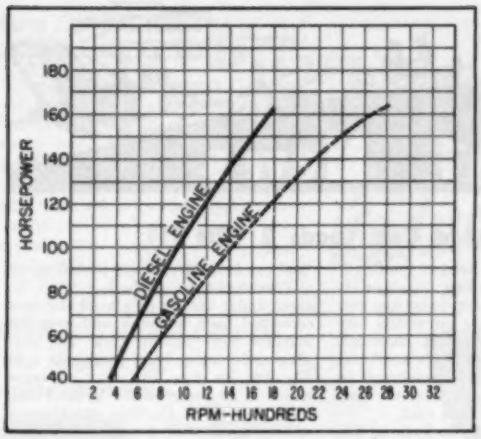


FIG. 1—HORSEPOWER developed at various engine speeds by typical gasoline and diesel engines rated at 160 hp.

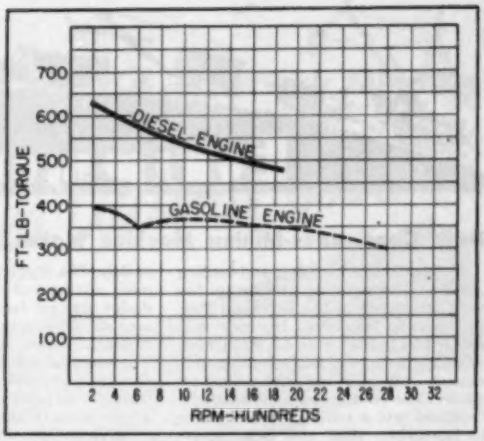


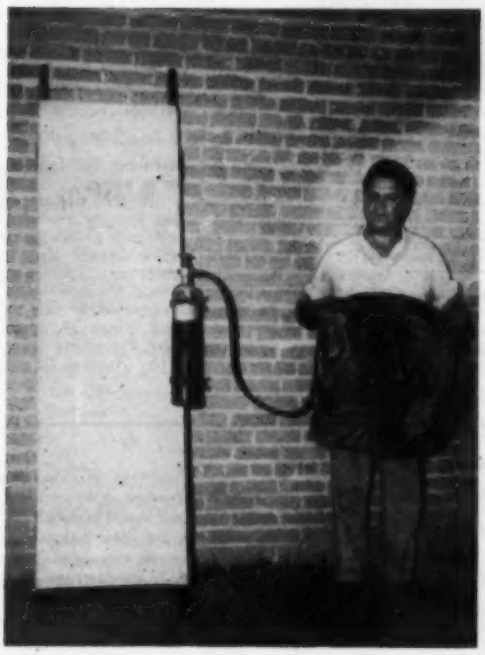
FIG. 2—TORQUE developed by comparable 160-hp gasoline and diesel engines at various engine speeds.

tire mileage, it is quite evident.

It is not unusual to see a driver not properly instructed in the operation of diesel trucks actually spin the drive wheels in starting off, even with a load of 40,000 to 50,000 lbs, Mr. Beckett reports. The same thing happens to some extent every time he shifts to a higher gear if he is prone to race the motor between gear changes. The result is a tremendous loss of tire mileage and, of course, increased tire costs and increased operating costs.

Whenever a problem of so-called fast wear occurs on diesel equipment, it is not the tires nor the truck, but a matter of driver education, Mr. Beckett maintains. Every truck manufacturer is interested in his equipment being properly and economically used and will gladly supply training pamphlets and recommendations for the most economical engine speeds for starting and accelerating to secure tip-top performance from both the truck and tires, he suggests.

Oxygen-Hood Stretcher Saves 20 Apparatus Men



WHEN AN APPARATUS MAN engaged in recovery work after a mine fire or explosion collapses from fatigue, heat, illness or an apparatus failure, it is an extremely serious situation for him and the other men on the team. Apparently, numerous lives lost that way could have been saved if an oxygen-hood stretcher had been available. This new piece of rescue apparatus was used to excellent advantage last year in recovery of a sealed fire area in the Rosita No 6 coal mine of the Cia. Carbonifera de Sabinas, S. A., in the state of Coahuila, Mexico. Its use was briefly mentioned at the Kentucky Mining Institute 1950 meeting in a paper, "Recovery Operations at Rosita Mine," by Karl Marshall, director of safety for the company, which is a subsidiary of the American Smelting & Refining Co.

As shown in the photograph, an oxygen cylinder with an attached hose and hood is clamped to the top of one of the stretcher's side rails. Mr. Marshall reported that at least 20 men were brought out with this stretcher, and that all of those who had "passed out" had revived in the hood before they were carried through the air lock. Four of the 20 men "went down" because of apparatus failures. Most of the others were only dizzy from fatigue or heat. The recovery job took 61 days and involved 3,698 man-hours of work under oxygen-breathing apparatus.

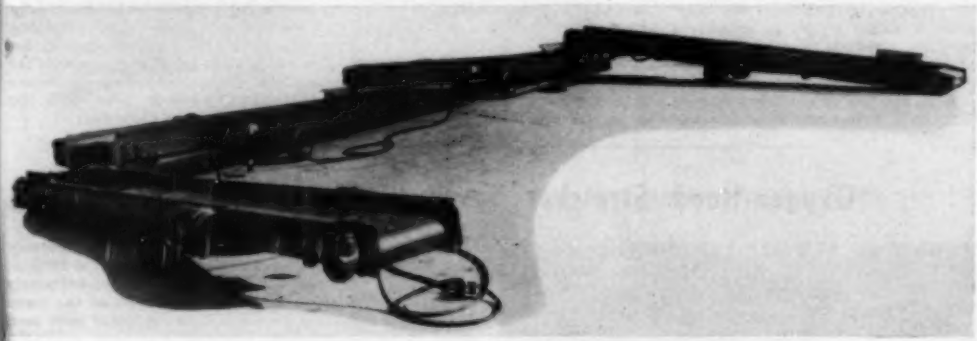
Do Good Ideas Come Easily?

IF YOU'RE ONE of the many coal men who successfully generate a new or different idea every so often, you ought to get the credit you deserve. If you tell COAL AGE, it will help others as well. A short letter in your own words will do the trick, and COAL AGE will gladly pay you $5 or more for each acceptable "Operating Idea," on publication. Write: The Editor COAL AGE, 330 W. 42nd St., New York 18, N. Y.

New Continuous-Mining Machine Makes 42-In Cut, Loads 2 TPM (1)

A continuous mining-and-loading machine of completely new design has been announced by the Goodman Mfg. Co. Crawler mounted, the new machine is 34 in high over-all, 95 in wide, and 27 ft long, and has a loading-and-cutting rate of 2 tpm, the maker reports. The pilot model of the unit introduced into a southern Illinois mine in November, 1950, still is in operation, and while some mechanical difficulties have been encountered, the solution of these problems is known and will be incorporated in later models. The digging head of the Goodman mining-and-loading machine is designed to cut from top to bottom and consists of a cylinder on which bits cutting narrow kerfs are mounted. The cores between the kerfs are broken out mechanically, resulting in larger percentages of coarser coal above ¼ in in size, it is said.

In operation, the main body of the machine remains stationary as the digging head is sumped 18 in into the coal. The digging head then moves downward, making a cut 42-in wide. Coal cut from the face is picked up by a Goodman-type gathering head located under the digging head and then conveyed back, through and over the machine into shuttle cars. The digging-and-loading head swings in a 90 deg arc, as does the rear conveyor which is so designed for greater machine flexibility. Further experiments will be made with the pilot model before commercial units are made available for sale, the company reports.—*Goodman Mfg. Co., Chicago 9.*



Portable Conveyor Specifically Designed for Continuous Mining (2)

Specially designed for continuous-mining service, The Barber-Green Model 366 portable mine conveyor is said by the manufacturer to answer the need for a lightweight durable conveyor that can be easily positioned manually to follow the machine. The new unit is furnished with a 24-in belt, is 20 ft long and is mounted on two pneumatic-tired wheels, well balanced for "man-handling." It weighs 1,600 lb and has an over-all height of under 24 in at the point of discharge. The conveyor is powered by a sturdy simple right-angle drive which includes a permissible 3-hp electric motor, junction box and control. To facilitate operation of as many as 12 to 15 conveyors in series, a master control stops and starts all units at once and will halt the entire series if one stops or the connecting cable is separated. Another feature cited by the maker is a combination skirt board and flexible-rubber flashing design, which permits using a deeper greater-capacity trough, minimizes spillage and makes a more practical transfer from one unit to another. A detachable loading hopper also is available. Although primarily designed for continuous mining, the new series can be effectively adapted to various conventional-mining plans if lump size is not excessive, the maker says. —*Barber-Greene Co., Aurora, Ill.*

"Information . . . of considerable value"

"RECENTLY WE WROTE and requested your cooperation in furnishing bulletins supplied by advertisers of your magazine," an official of a coal-operating company writes COAL AGE. "For the last several weeks we have been receiving these bulletins and have begun to build up a workable library. The information contained in these bulletins is proving of considerable value in making purchases and planning our operation," he continues.

HOW ABOUT YOU? Are you taking full advantage of the wealth of helpful information offered in this section every month? Manufacturers are glad to send you their latest bulletins and added data on new equipment. There's no obligation and it takes only a minute to fill out the postage-free request card facing p. 124. To make sure you won't miss a good bet for lower cost and higher efficiency, make a quick check of the following pages NOW.

Mine Official Reports 37.5% Lower Bit Cost

Officials in an Armstrong Co., Pa. mine report that Kennametal Mining Machine Bits result in 37.5% more cutting per bit life as compared to other carbide bits that have been used. Total tonnage: with other carbide—3,126 tons, with Kennametal—4,994 tons. Service between bit changes was increased from 9 places to 14 places. Bit life was 37.5% longer.

●

Matthews, Moore Coal Co., Gets Answer to Power Problem

Results of power test made for Mr. Claude Matthews, Supt., Moore Coal Co., Devonia, Tenn., show that Kennametal U-5-H Bits require 29% less power than steel bits. Test was made by a West Virginia consulting company. Particulars are: The machine using steel bits averaged a load of 52 H.P. on the motor while Kennametal averaged 37 H.P. or 29% lower average power. The machine which was rated at 50 H.P. operated at a 2 H.P. overload when steel bits were in service.

●

Bit Cost Reduced to .58 cents per ton, Clymer No. 2 Mine, Clearfield Bituminous Coal Corp.

J. F. Simpson, Mine Superintendent, says, "We have used Kennametal Bits for three years and they have cut 284 places per set." Prior to the use of U-7 Bits at the mine, complete bit changes or resettings were made on each place that was cut. Bit cost averages only .58 of one cent per ton.

●

Booklet on Mining Bits Available for the Asking

New styles, sizes, prices and performance data on Kennametal Bits are available in new Mining Catalog M-6 published by Kennametal. You can have a copy by writing us and asking for it.

(*Advertisement*)

Duquesne Light Co.'s Harwick Mine

Reduces Cutting Cost

with Kennametal Bits

James H. Truax, mine superintendent, says, "We checked the performance of 100 Kennametal U-4 Bits and found that they gave a bit cost of $ .0026 per ton, which we consider very good." The cutting was done in a section of the mine where the coal was only medium hard to cut, and in other sections where it was more difficult, the U-7 was put on test. The record there, according to James Truax, was also satisfactory. He says, "The U-7 Bits have helped to make a difficult cutting job easier and more profitable." In this cutting, 14 places were cut between bit changes and 50 places were cut per set of bits.

Beside lowering bit cost, other advantages that are obtained by using Kennametal Bits are more efficient cutting because fewer stops are made to change or set bits, a large saving is also made on machine repair because the bits stay sharp and allow it to cut freer, and due to less changing and fewer dull bits, the cost of bit reconditioning is greatly reduced.

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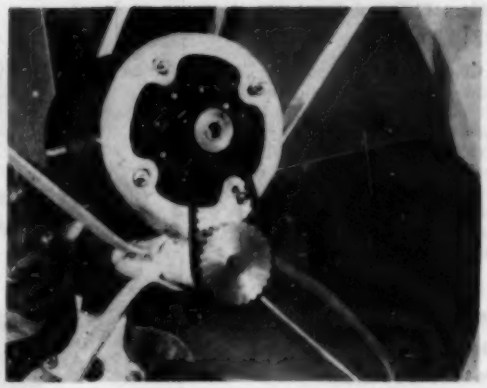
New Drive Belt Eliminates Slippage (3)

Its new-type rubber-and-fabric belt with teeth is a major advance in power transmission, according to U. S. Rubber Co. Known as the Gilmer Timing Belt, the new belt will not slip and permits split-second precision timing, the maker says. Other features cited by the company include: speeds up to 16,000 fpm; more quiet operation that precision gears running in an oil bath; no lubrication required; speed ratios up to 30:1; and the elimination of belt stretch that permits operation on fixed centers without takeup adjustment. The belt's constriction permits pulley diameters as small as ⅛ in at 10,000 rpm, even with a heavy load, it is said. Similar in appearance to a flat belt except for the rubber teeth that engage corresponding grooves in the pulleys, the belt can be manufactured in any desired size and in a variety of materials. While current production is for specifically engineered drives, a standardized line of stock drives in both light and heavy duty constructions is to be available.—*L. H. Gilmer Div., U. S. Rubber Co., Philadelphia.*

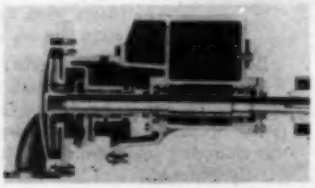


Truck Line Offers Varied Features (4)

Increased power, new styling, better brakes, improved steering for easier handling, more driver comfort and newly designed shock absorbers are among the more than 50 new features providing faster, safer and more economical hauling of larger payloads in the new B-3 Series of Dodge "Job-Rated" trucks, the manufacturer reports. Horsepower increases are as high as 20% in some of the eight engines powering the new Dodge line, which offers gross vehicle weight ratings ranging from 4,250 to 40,000 lb and gross combination weight ratings up to 60,000 lb. Higher governor settings, redesigned fuel pumps, "hotter" spark plugs with improved moisture-proofing, larger-capacity generators, a new high-torque starting motor and more efficient cooling systems are included in the engine improvements, according to the company.—*Dodge Div., Chrysler Corp., Detroit 31.*

New Type Compressor Cuts Hose Wear (5)

A new-type large-size portable air compressor announced by Ingersoll-Rand, known as the Gyro-Flow 600, features a rotary-type compressor and delivers 600 actual cfm free air at 100 psi. With a total weight of only 9,500 lb ready for use, the Gyro-Flow is the lightest portable compressor in its capacity range, according to the manufacturer, who cites the additional advantages of simplicity and low cost of operation and maintenance, and discharge of air at less than 200 deg F under normal operating conditions which, together with thorough oil separation, greatly reduces hose deterioration caused by heat and oil. The Gyro-Flow 600 is driven by GM Series 71 6-cylinder diesel engine and also features the new "Air-Glide Capacity Control," which is said to automatically hold steadier and higher air pressures over the full range from 0 to 100% capacity, with only a 10-lb fluctuation of pressure. Bulletin 2310 available. —*Ingersoll-Rand Co., New York 4.*



New-Type Shaft Seal For Process Pumps (6)

A new-type shaft seal—the "Equiseal" stuffing-box—developed to eliminate leakage on Allis-Chalmers process pumps features a radially vaned sleeve which rotates with the shaft to create a pressure that equalizes the suction pressure, with the result that atmospheric pressure exists on the pressure side of the stuffing-box as well as outside to eliminate leakage, the maker reports. The "Equiseal" stuffing-box is not sensitive to wear or close adjustment and since it employs no complicated mechanism, it can prevent leakage even when handling viscous liquids or those with solids in suspension, it is said. The packing can be removed while the pump is operating on positive suction head without leakage even though there is a direct passage from pump suction to atmosphere, Allis-Chalmers points out. The new seal is designed for use on all A-C process pumps with suction heads up to 15 ft at 1,750 rpm, or 6 ft at 1,150 rpm.—*Allis-Chalmers Mfg. Co., Milwaukee, Wis.*

Arc Welder Generates Auxiliary Power (7)

New Hobart 300-amp gasoline-engine-driven arc welder is a self-contained unit, powered by a 6-cylinder 53½-hp, 1,500-rpm self-starting Chrysler engine directly connected to the welding generator and mounted

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Truck operators who do most or all of their driving on poor roads find Eaton 2-Speed Axles almost indispensable. They need extra pulling power under such conditions—and Eaton gives it to them by doubling the conventional number of gear ratios. When roads are bad, when climbing stiff grades, or when starting under full load, drivers use "low low". When highballing, they make better time because they can shift into "high high". Between these two extremes, drivers have a choice of several ratios to meet the demands of road and load conditions.

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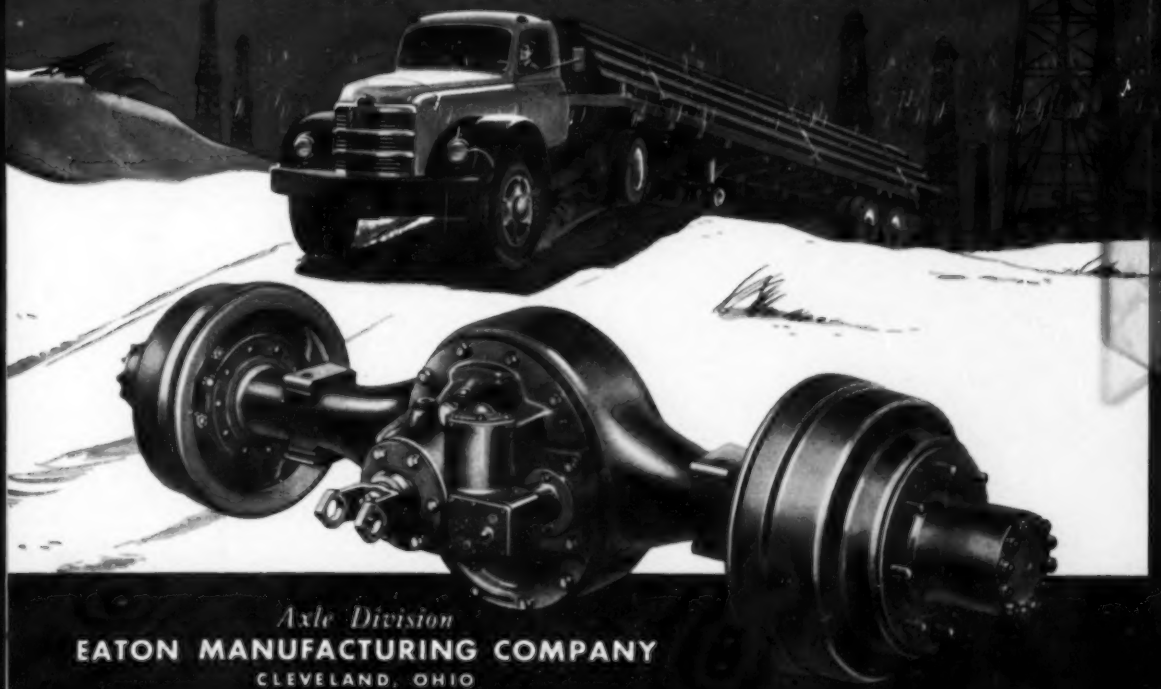

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Mechanizes erecting of timbers, making it a quick and safe job for a two-man crew. Machine hauls trailer with timbers, saws timbers and positions cross-bars, holding them against roof while posts are measured, sawed and placed. Battery-powered, pneumatic tired, with hydraulically-driven saw. Carries U. S. Bureau of Mines permissible plate.

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With this attachment *Roof Bolting* and *Timbering* can be done efficiently with one machine in mines where both types of roof support are used. Full hydraulic power and control provides constant pressure on drill feed and easy positioning with relation to roof or floor. Drill and torque wrench are combined in a single "V"" type head.

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Maneuverable, 3-wheel, battery-powered, pneumatic-tired unit for carrying mine personnel and hauling trailers loaded to one ton in very low coal. Driven from prone or sitting position. Overall height only 22 inches. Increases efficiency of low-seam mines by bringing key men and materials quickly to the spot where needed. Carries U. S. Bureau of Mines permissible plate.

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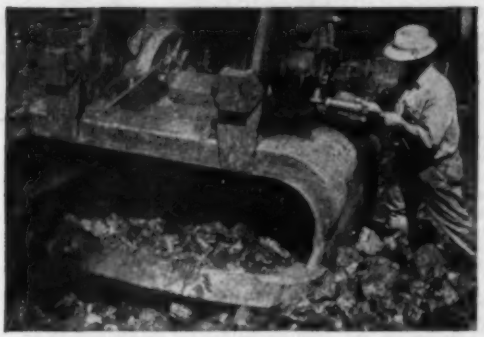

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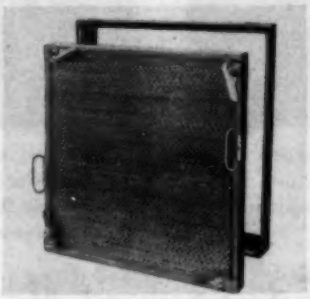
on a welded steel frame, and is equipped with an auxiliary 3-kw power generator that may be used for lights and a wide variety of machine and portable power tools. The welding generator is rated at 40 v 300-amp under 1-hr resistance load at 1,500 rpm and has a current range from 50 to 400 amp, the maker reports. Particularly suited for repair and maintenance, the unit is completely enclosed by a sheet-metal canopy with hinged side doors providing full access.—*Hobart Bros. Co., Troy, Ohio.*

Unit Substation for Low-Voltage Service (8)

A new "midget" load center unit substation especially designed for low-voltage regulated ac lighting and power service, known as the GE Inductrol Power Pack, incorporates in one steel housing an air-circuit breaker, a dry-type transformer and an air-cooled induction regulator. Available in either single- or three-phase ratings, the unit has a capacity ranging from 15 to 100 kva, with incoming circuit rated 480 or 600 v, 60 cycles, and a regulated output at 120/240 or 208Y/120 v. The power-regulating unit permits bringing power to the load area at relatively high voltage for substantial savings in cable, with the voltage stepped down at the load center to the value required by the load being served and automatically maintained at that level, thus assuring maximum life and optimum performance of connected equipment, the maker points out. Completely metal-enclosed, the power pack can be installed in any indoor location without the expense of fireproof vaults, and its compactness and ease of installation permits overhead mounting to save floor space, it is said. Bulletin GEA-5571 offers full details.—*General Electric Co., Schenectady 5, N. Y.*

Demand-Oxygen Unit for Emergency Treatment (9)

New M-S-A demand-type oxygen unit for emergency treatment of smoke inhalation, heart failure, asthma, pneumonia and carbon-monoxide inhalation, is completely self-contained in a sturdy carrying-case and is easily put in operation merely by opening the cylinder valve and placing the facepiece on the patient, the maker reports. Oxygen is administered automatically as the patient's breathing requires it, and the instrument also can be used to supply oxygen in conjunction with artificial respiration in cases of asphyxia, it is said. The complete unit consists of a half-mask facepiece, regulator assembly, 6-ft length of non-kinking hose, a 40-cu ft-capacity oxygen cylinder and the carrying-case. For details, request Bulletin CW-5 from *Mine Safety Appliances Co., Pittsburgh 8.*

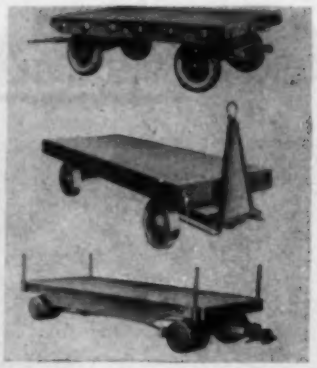


Air Filter Designed for High Velocities (10)

New American Type HV high-velocity unit air filter is designed to operate at velocities up to 500 fpm and maintain a uniformly high-cleaning efficiency over a wide range of air velocities, the manufacturer says. It is made of corrugated strips of fine-mesh wire in which the corrugations taper so that when two strips are placed together they form a series of pyramid-shaped pockets, the small ends of which are closed to the air flow to eliminate any open air passages through the media. The unit can be serviced in the conventional way with washing and charging tanks, or reconditioned by washing out the accumulated dust with a hose and spraying with filter adhesive, it is reported. Bulletin 203 on request.—*American Air Filter Co., Inc., Louisville 8, Ky.*

Industrial Trailers in 5- and 15-Ton Ratings (11)

Three new industrial Phillips trailers designed for heavy duty hauling features all-welded, heavy-gage steel construction, may be used singly or in tandem, and are available with a fifth wheel at both ends or at one end only, the maker says. All wheels are equipped with Timken roller bearings. The three units (above, top to bottom) are: Model TFP-100, 5-ton capacity, 16-in diameter pneumatic-tired wheels, 40½-in clearance, with stake pockets



on sides and ends; Model TF-100, 5-ton capacity solid-rubber tires, 23-in. high, with four stake holes on each side; Model TF-300, 15-ton capacity, over-all height of less than 24 in, dual solid rubber-tired wheels and a removable stake near each corner.—*Phillips Mine & Mill Supply Co., Pittsburgh 8.*

Bin Vibrators Feature Quieter Operation (12)

New "Semi-Noiseless" vibrators in larger sizes added to the Syntron line of bin, hopper and chute vibrators, are said by the maker to perform the same function as standard models, with a sharp reduction in operating noise accomplished through a design change in which rubber bumpers have been substituted for the metallic striking parts. Designed for interior applications where noise is a factor, the units are available in four models for operation on 110, 220, or 44 v ac and installation on units with a wide capacity range. They feature the Syntron variable vibration controller, which permits regulating the intensity of vibration to suit material handle, it is said. Bulletin available from *Syntron Co., Homer City, Pa.*

Bushing Standardization Cuts Cost and Stocks (13)

A new standardization program, replacing more than 1,000 different types of transformer and circuit-breaker bushings with only 38 stand-

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Quality control of Wickwire Rope is *complete and uninterrupted* from the actual smelting of our own iron and steel to the final making of the finished rope.

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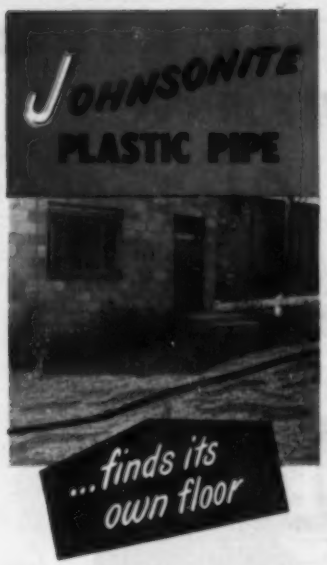

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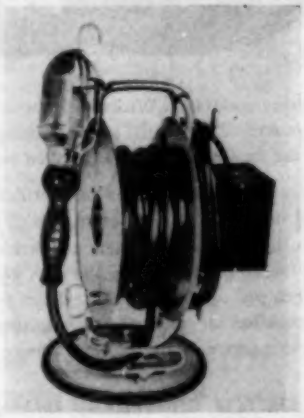
ard bushings of maximum usefulness, announced by the General Electric, has resulted in manufacturing savings that permit prices for standard bushings of 10% less than for similarly rated non-standard bushings, the company says. The standard bushings include transformer and circuit-breaker types rated from 15 to 230 kv inclusive, 1,200 amp and below. In addition to cost savings, all components for standard bushings up through the 161-kv rating will be stocked at the factory, permitting short shipment time and prompt handling of emergency requests, and considerable user inventory investment and storage space also can be saved. Bulletin GEC-715 from *General Electric Co., Schenectady 5, N. Y.*

High Pressure Air Hose (14)

With a tube and covering that are impervious to hot air, hot oils and high pressure, the National "Loom-Braided" heavy duty air hose will outlast conventional hose and retain its flexibility even under high pressure, thus eliminating frequent hose breakdowns, repairs and replacements, the manufacturer says. Construction features cited by the maker included greater wall strength without excess weight or bulk for reduced expansion and elongation and fusing of the tube, body and cover in a special process that is said to practically eliminate fixed twists, flattening and kinking. The Buna-N tube is non-swelling and non-flaking and the Neoprene cover is designed to withstand heat, cold, abrasion and extreme abuse, it is reported. The reversible Boss couplings ordinarily supplied may be easily removed and re-attached without special tools. Bulletin offers full details on this and other National Hose. *—National Hose-Metal Hose & Tubing Co., Dover, N. J.*

Equipment Shorts You'll Want to Check

(15) RUSTPROOF PROTECTIVE PAINT COVERING, known as "Derusto," will prevent, absorb and stop rust on either new or rusted surfaces, the maker says. Said to contain the exclusive "Derustite" and also to be effective against acid fumes and alkali solutions, Derusto is available in standard industrial colors, is self-leveling and can be applied by brushing, spraying or dipping. Free sample available. *—Master Bronze Powder Co., Hammond, Ind.*



(16) SAFE WORK LIGHT—Low-voltage Etraco "Reel-Lite," according to the maker, is designed to replace a 110-v trouble lamp and provides greater worker safety for use in damp or wet locations. It is available in several sizes with extension cords of 50 and 100 ft.—*Etraco Mfg. Co., Flemington, N. J.*

(17) VERSATILE HAMMER-DRILL COMBINATION, known as the Wodack "Do-All," is said to utilize one motor for effectively performing three types of work: (1) drilling concrete and masonry, (2) drilling metal and wood and (3) driving, grinding, buffing and operating wire wheels. The complete unit weighs 15 lb and operates on either ac or dc power from 25 to 60 cycles.—*Wodack Electric Tool Corp., Chicago 41.*

(18) WEATHERPROOF CLUSTER LIGHTS for outdoor protective lighting, the new Stone Cluster Box No. 25, takes from one to five standard lampholders for 150-, 200- and 300-watt stock bulbs and may be mounted directly to ½-in. conduit without accessories, it is reported. Extra protection is assured since burn-out of one light does not effect the remainder of the cluster, the maker points out.—*Stone Mfg. Co., Elizabeth 4, N. J.*

(19) INDUCTION REGULATORS—A complete new line of GE 3-phase dry-type induction-voltage regulators includes both self-cooled and forced-air-cooled units in standard 10 and 20% (raise and lower) ranges of regulation. Offered in ratings from 120

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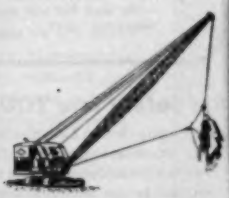

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Laughlin Safety Hooks, costing little more than ordinary hoist hooks, pay for themselves many times over by preventing accidents. That sturdy safety latch guards against dangerous failure — mechanical or human — in a number of important ways. For example:

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by changing over to Laughlin Safety Hooks. Made of drop-forged, heat-treated steel, they have pressed steel latches in the smaller sizes, cast bronze latches in the larger sizes, all with stainless steel springs. Available in various types for 750 lb to 15 ton safe working loads at your mine, mill or oil field supply house.

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to 600 v and from 12 to 85 kva, the regulators feature a new arrangement of the 3-phase winding on a single core that permits a considerable saving for users of such units in the ratings being offered, the maker reports. They are house in an all-steel ventilated cabinet and are protected from excessive dust collections by the cabinet design.—*General Electric Co., Schenectady 5, N. Y.*

(20) BETTER PROTECTION IN WELDING, chipping and heavy dust areas is assured with the extra-tight fit secured with the new Willson molded-rubber detachable padding mask for its heavy-duty cover-all safety-cup goggles, the maker says. The mask is easily attached to the goggles without tools or sewing and may be bought with new goggles or secured for goggles already in use. It is also said to provide added clearance when goggles are worn over prescription glasses.—*Willson Products, Inc., Reading, Pa.*

(21) CORROSION AND RUST CONTROL for all metals, woods and concrete mixes, together with effective lubrication service, may be secured with Tinallium "Pro-Tex-It," the maker reports. A non-drying black paste, the material may be applied by brush without prior cleaning of rusted metal surfaces and offers protection against alkalis, rust, corrosion, oxidation, heat, cold, steam, gas or sulphur fumes, brine and other agents, it is said. It reportedly is non-toxic, fire-resistant and water-repellent and is effective up to 500 F. Full application details and test data available from *American Sand-Banum Co., Inc., New York 20.*

(22) LIGHTWEIGHT ELECTRIC HOISTS — New Frame B Wright Speedway electric hoists available in capacities from 250 to 1,000 lb are made with a shorter deeper drum and thus are lighter and better balanced, the maker says. Especially suited for hook suspension, the units use a smaller load hook and trolley, have shaved gears and a lower-limit switch.—*Wright Hoist Div., American Chain & Cable Mfg. Co., Bridgeport 2, Conn.*

(23) METAL ENCLOSED DC POWER SUPPLIES—A new line of GE conversion units utilizing selenium rectifier stacks are applicable wherever dc power is required and may be used for excitation of synchronous motors,

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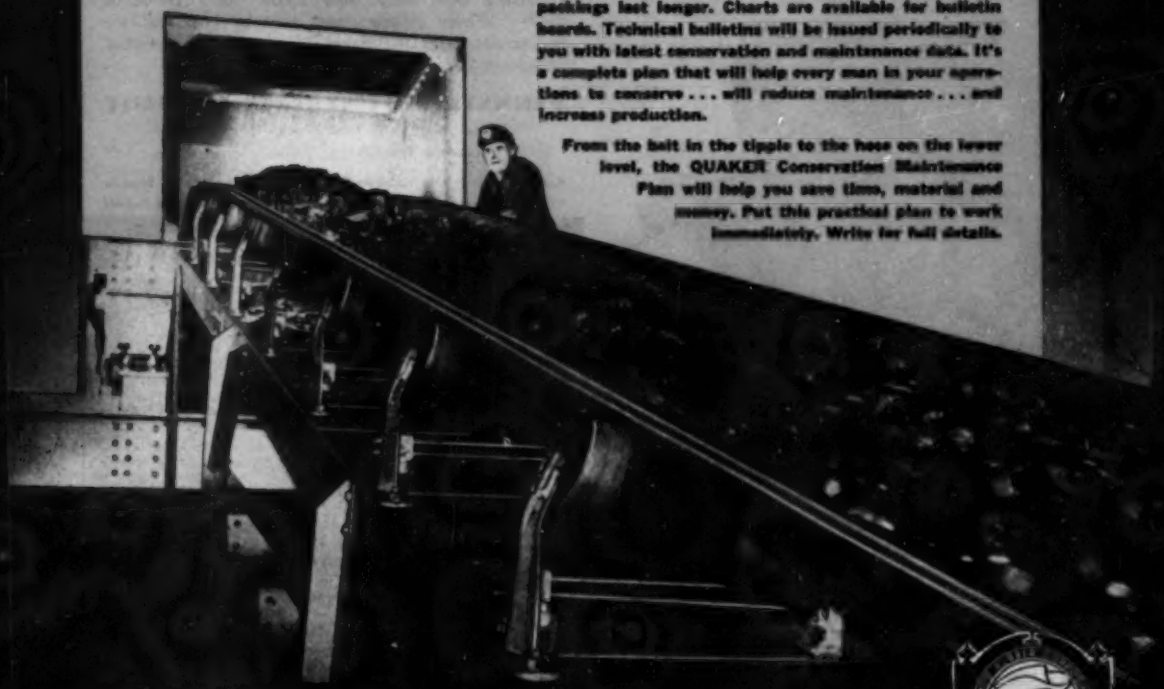

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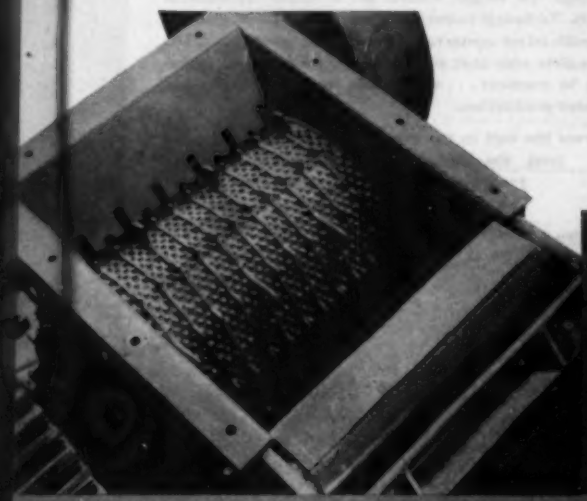

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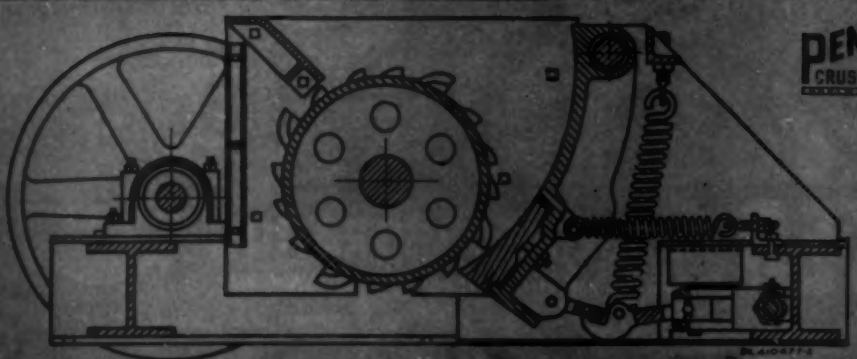

PENNSYLVANIA CRUSHER COMPANY

operation of de elevators, cranes and machine tools and for conversion of ac feeders to dc for motor exports. The units can be furnished to supply either 120 or 230 v dc from a 208-, 220- or 440-v 3-phase 60-cycle ac supply. Compound-cooled equipments are available in ratings from 0.15 to 5 kw and fan-cooled units from 7½ to 15 kw, with larger ratings secured by connecting two or more rectifier units in series and/or parallel to increase the current or voltage. The units offer operating efficiencies up to 91 to 95%, with a power factor of .98, and are built without moving parts except for the fan. It is sold.—*General Electric Co., Schenectady 5, N. Y.*

(34) SAFE EQUIPMENT-CLEANING SOLVENT—TO 128, designed as a safe alternative for carbon tetrachloride in applications where toxicity or solvent residues are factors, may be used for cleaning both mechanical and electrical equipment parts with complete safety to men and materials, the maker states. Available in 55-gal drums, TO 128 is a clear water-white solvent which features low toxicity, minimum corrosive effects, high flash point and zero residue on drying. It is sold.—*Pittsburgh Industrial Chemicals Div., Fine Organics, Inc., New York 5.*

EQUIPMENT BULLETINS

These Helpful Catalogs Are Available Without Obligation—Merely Circle the Proper Number on the Postage-Free Card

(35) HEAVY-MEDIA COAL PREPARATION—New Technical Bulletin, "Heavy-Media Separation Processes for Coal Preparation," is No. 18 in the series of "Mineral Dressing Notes" available from the Mineral Dressing Div., American Cyanamid Co., New York 20. The 36-p booklet offers detailed data on the application, operation and results of heavy-media separation processes, with typical flowsheets and information about principles of heavy-media installations adaptable to all coal-preparation plants.

(36) PLASTIC PIPE—Johnson Plastic Corp., Chagrin Falls, Ohio, has published a new catalog on Johnsonite plastic pipe, sold by the company to be so flexible that it can be tied in a knot and to be 15 times lighter than ordinary pipe. Other features noted for the corrosion-proof plastic pipe, which can be cut with a knife, include acid resistance, long service life and low cost. A 500-ft coil of ¾-in pipe weighs only 50 lb and application is further simplified, it is said, by the fact that the pipe bends in any direction, which simplifies many installations.

(37) DC MOTORS AND GENERATORS—16-p Bulletin B-4500 describing the new Life-Line Type EC dc motors and generators, available from Westinghouse Electric Corp., Pittsburgh 30, shows how the new design uses rolled-steel frames, heavy-steel brackets, steel-angle feet and pre-lubricated double-sealed ball bearings to provide added strength and long life without outages. The booklet also covers various accessories and operating features and shows the dimensions and mountings for many different applications.

(38) BEARING MAINTENANCE—A continuing supply of bearing maintenance techniques and successful maintenance, installation and removal procedures being published in pamphlet form by The Anti-Friction Bearing Distributors Association, Cleveland 15, is the first example, it is thought, to publish in permanent form all available maintenance information on every type of bearing. A file-folder type of binder is being used to bearing users requesting it, in which successive bulletins can be inserted.

(39) "HOW TO SAMPLE COAL AUTOMATICALLY" is the title of a booklet covering the operation, features and construction of the Improved Brotherhood automatic coal crusher and sampler. Available from the Brotherhood M'f'g Co., Dorchester, Boston 25, Mass., the bulletin graphically illustrates the 26 of 34 basic operations said to be illustrated by one of the automatic units.

(40-41) CRAWLER TRACTORS—Two 16-p catalogs—each telling the story of a new All-crawler tractor—have been issued by Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee 1. Each discusses major features, operation, and maintenance and contains complete specifications, plus details of allied equipment and special accessories.

(42) One catalog describing the Model HD-5 weighing 21,100 lb and developing 78 drawbar horsepower.

(43) The other A-C Catalog covers Model HD-10 weighing 37,450 lb and offering 142 hp at the drawbar.

(44) SYNCHRONOUS GENERATORS—Bulletin GEA-5470 on Tri-Clad high-speed synchronous generators, announced by the General Electric Co., Schenectady 5, N.Y., covers generators for standby, peaking and prime-power in ratings from 1,875 to 30 kva with frequencies of 60 and 400 cycles. Four designs are described, externally-ventilated, unventilated, packaged-engine 4-pole synchronous generators, and high-frequency 12-pole synchronous generators.

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EQUIPMENT BULLETINS AVAILABLE—Cont'd

(32) DUST CONTROL—Detailed selection, operation and maintenance data for those responsible for dust control are contained in a 64-page reprint book, "Industrial Dust Control Through Exhaust Systems," now offered by the Pangborn Corp., Hagerstown, Md. Divided into three major sections, (1) exhaust hoods and piping systems, (2) dust collecting centrifugals and (3) exhaust fans and drives, the booklet offers detailed information on the engineering, installation and proper application of dust-control equipment and methods.

(34) 15-TON REAR-DUMP TRUCKS, Euclid Models 5S FD and 5S VD, are described in a new catalog released by the Euclid Road Machinery Co., Cleveland 17. The bulletin covers the various features of two 6S-highway hauling units built for crawler earth, rock, and other heavy excavation, and powered by Cummins 335-hp or General Motors 165-hp diesel engines, offering top speeds with 24,000-lb payloads of 21.5 or 28.4 mph.

(36) BULLDOZERS, grade-builders, and root rippers manufactured by Baker Mfg. Co., Springfield, Ill., to match the new and more powerful line of Allis-Chalmers HD-20, HD-15, HD-9 and HD-5 tractors are described in Engineering Bulletin 896. New design and performance features incorporated into the earthmoving attachments are covered, together with detailed specification, dimension and performance data.

(38) AMMETERS—Columbia "Tong Test" ammeters, said to permit instant and accurate measurement of ac or dc current flowing in the circuit are described in detail, with ranges and prices, in Bulletin TT-5025 from the Columbia Electric Mfg. Co., Cleveland 14. The units can be operated with one hand, weigh 7½ lb and may be carried in the pocket.

(39) AIR-COMPRESSOR DRIVES—New up-to-date information on motor drives for all types of large air compressors is compiled in the new issue of the E-M Synchronizer, No. 82, available from the Electric Machinery Mfg. Co., Minneapolis 18, Minn. In addition to application and selection data on both motors and controls for a variety of compressor types and sizes, the 24-p bulletin contains a technical discussion of "V" Synchronous [illegible] as well as a wide variety of motor and control problems for compressor installations.

(40) DRAINAGE PIPE—A new 16-p booklet entitled "Armco Corrugated Metal Pipe—A Type for Every Need," published by Armco Drainage & Metal Products, Inc., Middletown, Ohio, lists full-round pipe and pipe-arch for various types of sewers, culverts, combination or selection systems and contains helpful data for selection and installation of the most suitable structure.

(29) SLING CHAINS—Bull-dog BC-61 describes Sterling wrought-iron sling chains, accustomed by The Cleveland Chain & Mfg. Co., Cleveland 3, coupon sling-chain safety rules and full data on chain inspection, use and care, recommended load limits for various chain sizes and suspension angles, and single- and double-sling chain specifications.

(35) OPEN STEEL FLOORING and treadplate are thoroughly covered in Catalog 1151, available from the Machinery Div., Dravo Corp., Pittsburgh 22, national distributors for the Tri-Lok Co. The catalog discusses the different types of Tri-Lok open steel flooring and safety treads and contains specification data, safe load tables and installation methods.

(41) COMPRESSED-AIR CLEANER—Bulletin 1150 issued by the Lapeer Engineering Co., Chicago 40, offers detailed data on the Lapeer Airkiller, which is designed to clean and dry compressed air and is said to remove 92% of oil, water and dirt from air and gas lines.

(42) CHAIN DRIVES—Suggestions on how to install, maintain and lubricate roller chains, sprockets, and on planetary chain drives, horsepower and selection, are offered in Catalog ARC-51-PB available from Allen Chain & Mfg. Co., Philadelphia 24. The bulletin also contains power-transmission ratios, horsepower-rating charts, list prices and specifications.

(43) FOR A DRAINAGE PROBLEM where headroom is limited or confined restricted runoff is necessary, bulletin describing how Armco Pipe-Arch and Multi-Plate Pipe-Arch carry more water than round pipe is available. Entitled "An Economical Answer to Limited Headroom—Pipe Runoff," the folder discusses erosion and corrosion problems and includes test data, size recommended sizes and gages. Available from Armco Drainage & Metal Products, Inc., Middletown, Ohio.

(44) CORROSION CONTROL on exteriors of steel, concrete, brick, formed block and plywood structures and tank linings, also is thoroughly discussed in a bulletin on the use of vinyl-plastic coatings issued by Carey & Plasite Coating Co., Maywood, Calif. The booklet offers a chemical-resistance chart and full data on specific properties and applications.

(45) ALL-WELDED CHAIN-BELT-DRIVEN units in sizes 10 to 48 in. [illegible] are described in Bulletin S-15 issued by the Link-Belt Co., Chicago 9. A subsidiary of the Rex Chain Belt Co., Inc., Milwaukee 1, Wis. Full operating details and specifications are included, along with a summary of Johnson's complete line of conveyor-handling and conveyor-handling equipment.

(46) MINING MACHINERY LUBRICANTS—Data Book 1-61 available from the Lubriplate Div., Fiske Bros. Refining Co., Newark 5, N. J., offers detailed data on properties, application and service of the Lubriplate lubricant line. Recommendations for various types of mining machinery are included.

(47) TABULATING MACHINES—"Figure-Fact Abacus Are Increasing at Machine Speed . . . with Machine Accuracy" is the title of a new folder issued by Remington Rand, Inc., New York 10. The folder offers detailed information on applying Abacuses to payroll, cost, product and sales reports, inventory or invoices prepared automatically with punched-card accounting machines, and shows the varied and complete line of Remington Rand tabulating machines.

(48) WATER- AND LIQUID-LEVEL GAUGES—New 32-p Bulletin 70 published by The Bristol Co., Waterbury 20, Conn., describes instruments for measuring and recording depth of water and other liquids in reservoirs, tanks, rivers, lakes, dams, and wells, etc., and covers a wide variety of units, including those for automatic control and remote recording, and for remote pneumatic pump control of water level with Metameter telemetering instruments.

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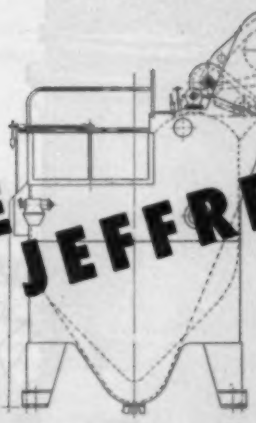

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The engine, *lubricated from the start by a Sunvis H.D. 700 Oil*, never lost a minute of operating time. The photograph tells why. Thanks to Sunvis H.D. 700 Oil protection, pistons were clean, the oil grooves open, the rings free, the skirts unmarred by seizure or scoring. The entire engine was clean and free of sludge or varnish, the bearings perfect, and not one of the cylinders showed more than 1/1000 inch wear. The charge of Sunvis H.D. 700 Oil in the crankcase at the time of overhaul was analyzed and found to be in good condition, though it had already been in continuous service for six months.

Because of performance like this, "Job Proved" Sunvis H.D. 700 Oils are in wide demand wherever unfailing lubrication is needed under tough operating conditions. They have high stability over a wide range of speeds, loads, and temperatures. Count on Sunvis H.D. 700 Oils to give your machines high operating efficiency and long service life. For full information, call the nearest Sun Office.

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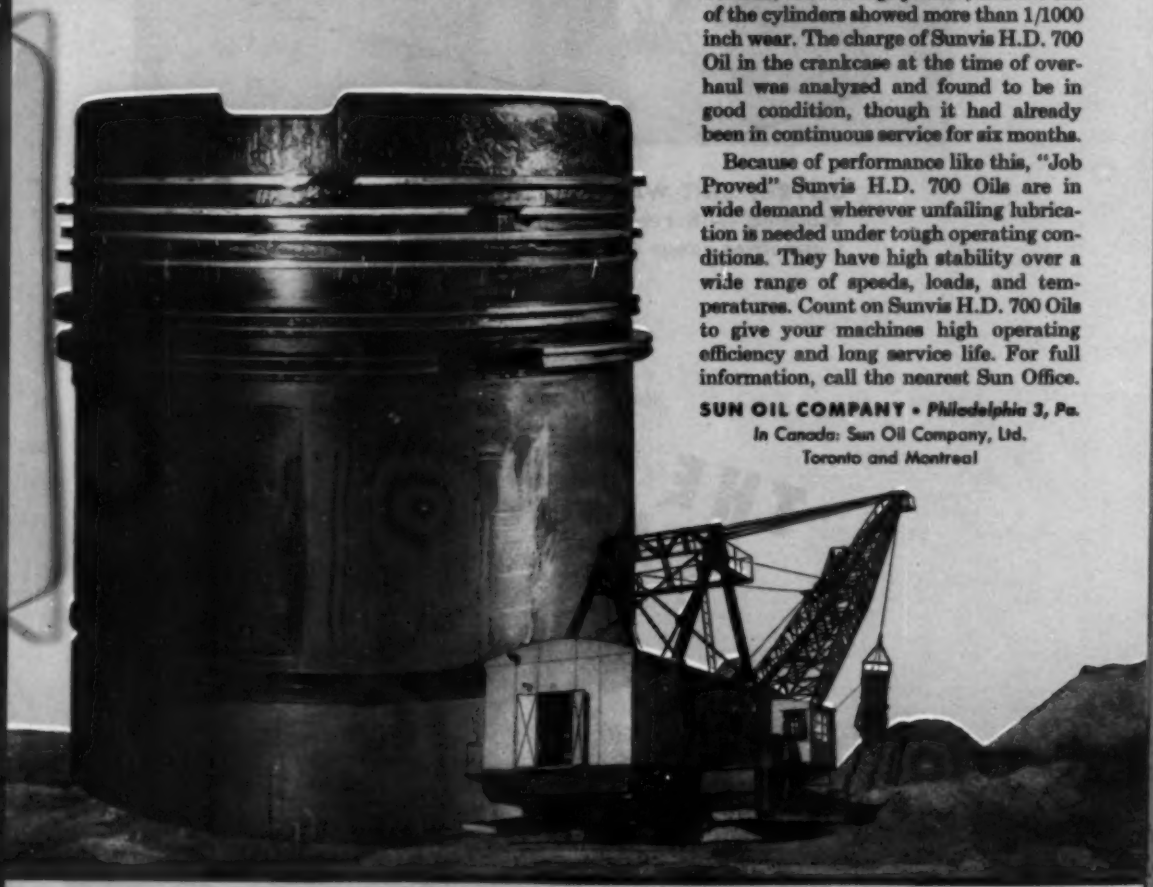

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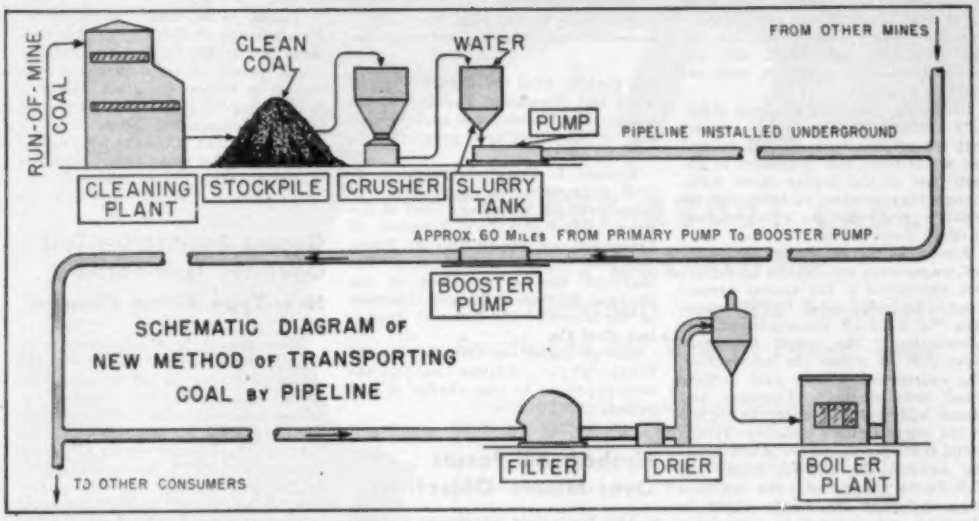

LONG-DISTANCE HAULAGE of coal by underground pipeline is the goal as . . .

Pittsburgh Consol Plans 3-Mi Coal Pipeline

A demonstration-size pipeline system for the long-distance transportation of coal will be constructed by Pittsburgh Consolidation Coal Co. this spring as soon as weather permits, the company announced Feb. 8.

The new pilot system, to be built at the Georgetown stripping operation of the Hanna Coal Co. Div., near Cadiz, Ohio, will consist of a 12-in. pipeline about 17,000 ft. long, together with special coal-crushing and slurry-preparation equipment and special pumps which the company has designed for the purpose. The system, expected to cost about $550,000, will be operated continuously and will handle several thousand tons of coal daily.

Preparation of the coal will include washing and crushing to fine sizes and then mixing with water to form a slurry, which will be fed into the system and moved through the line under pressure by the special pumps to equipment installed at the destination to remove the coal, the company explained. The pipeline will be completely instrumented so that all pertinent engineering data can be documented, it said. Materials and equipment for the project have been purchased, and engineering work is being done by Allen & Garcia Co., Chicago.

In announcing the project, Pittsburgh Consol said: "This pipeline project was begun by the Research & Development Division in 1949 after making studies of work done on the movement of coal by pipelines by other companies here and abroad over the past 50 yr.

"Early last year a small pilot operation was developed at Library, Pa., and experimental work has been under way at these facilities for several months. Development of the system has advanced as far as the present small pilot facilities will permit, hence the decision to build a full-scale demonstration pipeline system at a cost of about $550,000. This full-scale pilot pipeline project represents the final stage in the company's investigation of this method of transporting coal from mine to market."

On the same day that Pittsburgh Consol announced its plans for the test system, Sen. Donald H. Rolf introduced a proposal in the Ohio state legislature that would give coal pipelines a public-utility status and permits operators of such systems to condemn private property along the right of way. Pipelines carry oil and gas already have that right. In making the proposal, Sen. Rolf said that pipeline transportation of coal would be more economical than other means, would result in cheaper fuel for Ohio consumers and would broaden markets for Ohio coal.

Miner's Wage Boost Ratified, Coal-Price Boost Allowed

Price increases averaging 25c per ton in bituminous and 90c in anthracite were authorized Feb. 1 by the Office of Price Stabilization. The OPS order, following close on the heels of a $1.60-per-day wage increase for miners, thawed an earlier price freeze and offset part of the added production costs attributable to new wage agreements in both industries. The miners' wage increase, scheduled to become effective Feb. 1, was ratified Jan. 31

by the Wage Stabilization Board, five days after the new anthracite agreement was signed and one day before the price thaw.

Ratification of the wage boost came in a blanket WSB order covering labor contracts signed prior to Jan. 25 with wage clauses to become effective at a later date. Though the anthracite agreement was not signed until Jan. 26, the WSB ruled that the negotiating parties were in agreement on Jan. 24 and that thus the contract was valid as of that date. Bituminous miners won their wage boost earlier, Jan. 18. The anthracite agreement, like the earlier bituminous contract, was negotiated quietly.

In issuing the price-increase order, OPS spokesmen expressed the belief that competition from oil and natural gas would force coal producers to absorb part of the higher labor costs, though they pointed out that the allowable price increases were designed to offset wage boosts.

Almost at the same time that miners' wages went up, UMWA headquarters announced a $20 special assessment to be levied on all UMWA members "to ward off onslaughts of our adversaries." The union announcement did not name the adversaries. The assessment will be paid in four equal installments in February and March and will add about $9,500,000 to the organization's treasury. It was noted that several suits still are pending against the UMWA under the Taft-Hartley Act and some quarters suggested that Mr. Lewis might be planning an extensive organizing drive.

Foreshadowing another possible move by the UMWA, the rumor gained currency that union headquarters soon would ask for a merger of the anthracite and bituminous welfare funds. The two funds now operate separately. The rumored merger would even out differences in income between the two funds growing out of higher tonnage per man-day in bituminous and would effect some economies by centralizing administration. Both funds now are financed by a 30c-per-ton levy on all coal produced for use or sale.

Later in the month, on Feb. 7, Eric Johnston, Economic Stabilization Director, announced formation of a labor-management advisory committee to help him on stabilization problems. Mr. Lewis was included in the committee along with other labor and industry leaders.

Coal Men Named to Defense Posts

The appointment of three well-known coal men to government positions recently was announced in Washington.

Clyde W. Woosley, newly named director of the Division of Equipment and Materials for the Defense Solid Fuels Administration, for the past 3 yr had served as purchasing agent for the Binkley Coal Co. until his retirement last November. For 15 yr previously Mr. Woosley was superintendent of the Binkley's properties in Illinois.

Richard L. Bowditch, president of C. H. Sprague & Son Co., Boston, was appointed late in January chief of the Price Administration's Division of Transportation, Public Utilities, Fuels, Services, Imports and Exports. Mr. Bowditch also is president of the Sprague Steamship Co. and chairman of the board of the Imperial Smokeless Coal Co.

George Lamb, economist with the Pittsburgh Consolidation Coal Co., has been appointed to take charge of coal prices.

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Fireboss Bill Passes Over Miners' Objections

The West Virginia House of Delegates voted the controversial fireboss bill into law Feb. 22, touching off a series of walkouts that idled many miners throughout the state. The vote, 51 to 43, came at the end of a 3-yr debate and climaxed four weeks of bitter argument in the state capitol and a series of protest stoppages that idled a peak of 20,000 men shortly before the final passage.

The bill, now awaiting only the signature of Gov. Patteson, will become effective 90 days after the governor acts. He is expected to approve the bill.

The new law continues present provisions for safety inspections in that it permits section foremen and other supervisors to double as firebosses. The state supreme court last fall held that there was no specific provision in law to authorize this practice and ruled that firebosses should be hired for the express purpose of inspecting mines for hazards. Operators objected that the ruling would cost them $7,000,000 per year in payrolls. The state mining department had not put the court's ruling into effect.

In the debate and hearings preceding passage of the bill, representatives from UMWA local unions throughout the state were in evidence in the galleries and halls of the capitol. Mine operators actively supported the measure. The controversy was made more bitter by charges leading to an investigation of the state mining department and by allegations that bribes had been offered to legislators.

Before the final vote on the bill, an amendment was rejected requiring that special firebosses make inspections before the first and second shifts, leaving the third-shift inspection to a foreman. Another amendment, also voted down, would have exempted mines employing fewer than 25 men.

Idleness in the days immediately before passage of the bill, though centered in the northern panhandle districts, spread also to southern districts and even across the state line into neighboring Virginia. Peak production loss was estimated at 180,000 tons per day. On the day after the bill became law, some 3,800 miners were reported still idle.

Gorgas Gasification Test Operates Gas Turbine; New-Type Firing Planned

More than 2 yr of experiments by the U. S. Bureau of Mines and the Alabama Power Co. at Gorgas, Ala., show that gases from burning unmined coal may offer a low-cost fuel for generating electric power, Secretary of the Interior Oscar Chapman reported Jan. 29. A gas turbine driven by hot product gas from the underground burning of coal was operated at Gorgas for a short period, for the first time in this country, Secretary Chapman said.

Meanwhile, James Boyd, director of the Bureau, disclosed plans for a new experiment at Gorgas in converting coal into gas underground. In the new experiment, he said, it is proposed to open up a deeper coal seam, using electrical or hydraulic methods of opening passages between vertical boreholes. Bureau officials expect that the new procedure will improve the contact between the air and the coal faces underground and permit better control. If successful, it will be possible to produce a gas of relatively high heating value (80 to 100 Btu per cubic foot) without deterioration after a few days' operation, thus overcoming the difficulty encountered in previous experiments. Construction of the new unit will begin at once, he added.

Pioneer work on the electrical method already conducted in this country by the Sinclair Coal Co. and the Missouri School Mines (*Coal Age*, December, 1950, p. 130) has shown that connections can be made underground without manual driving of entries, according to the Bureau.

Some 8,000 tons of coal underlying 1 to 2 acres of ground have been burned to date from a single initial passage prepared at the start of the Gorgas experiment. Entries were driven into a coal bed and connected to the surface by large boreholes through

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Fastening cable about a binding post may make a good connection for a fused tap, but it takes time. It's a fussy job to form a loop in heavy cable and hold it in place while the post is being tightened. While it will hold most of the time, it just isn't as strong as a fused tap cable connection can be, and those 'once-in-a-while' pullouts usually tie up a lot of production.
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The set screw type H-1 terminal and the cam type H-2 terminal cover a range of cable sizes from No. 6 to 2/0, and both can hold tight enough to break the cable rather than let it slip. Fastening the cable to either is an easy job—just slide the bare cable end into the terminal hole and tighten the set screws or hammer the cam into position. Whichever you use, you've got a cable connection that will stay put!
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which air was admitted and the product gases withdrawn. No difficulty was found in burning the coal from an initial underground opening, and in conducting subsequent operations from the surface.

Among other things, the test program at Gorgas has demonstrated that a hot gas suitable for operating a boiler or a gas turbine can be produced continuously by burning coal in place. Temperatures above 2,000 F are readily achieved, Bureau officials report. In one section, operated for 16 mo, the total heat in the gas reached a maximum for the eighth month of about 70% of the heating value of the coal consumed. Gas with a heating value up to 150 Btu per cubic foot was obtained for short periods and gas of 40 to 80 Btu was produced for periods up to 8 or 10 days, the heating value deteriorating after that time.

Engineers Mark Progress On Overland Coal-Ore Belt

Engineering work for the proposed overland belt conveyor linking Lake Erie with the Ohio River from Cleveland and Lorain to East Liverpool has been completed and the Ohio legislature is being pressed to establish legal authority for the belt to operate as a public utility, according to recent announcements by H. B. Stewart, Jr., president, Akron, Canton & Youngstown R. R. and chief promoter of the belt project.

Data have been provided by engineering staffs specializing in belt conveyors, transportation, electric power, steel, and ore and coal production. The work has proceeded over 3 yr. Two belts now are projected, one for ore and the other for coal. In spite of increased costs, original estimates as to construction, rates and savings remain substantially unchanged. Two years ago the system was estimated to cost $210,000,000 and otnnage capacity was estimated from 30 to 52 million annually. Transportation savings on coal would amount to 50c to $1.50 per ton delivered in Youngstown, Cleveland and Lorain. Steel needed to construct the entire system and terminals would build only 15,000 open-top railroad cars while the conveyor would do the work of over 44,000 cars, it was said.

Meanwhile, the railroads reportedly were intensifying their fight against the proposed long-distance belt conveyor as an Ohio state senate committee scheduled hearings to begin Feb. 12 on a bill designed to give the belt conveyor public-utility and common-carrier status. The special transportation committee of the railroads issued a 30-page booklet attacking the "rubber railroad" and a vice president of the Nickel Plate road wrote many legislators listing five reasons why the bill should not be approved, it was reported. The 1950 legislature failed to act on a similar bill.

News in Brief

U.P. Mine 3 Yr Without Injury

Reliance No. 7 mine of The Union Pacific Coal Co. in 1950 completed its third straight year of operation without a lost-time injury. Two-time winner of the nationwide "Sentinels of Safety" Trophy for its perfect records in 1948 and 1949, the mine employs 264 men. During the 3-yr accident-free period, employees worked a total of 1,219,728 man-hours and produced 1,245,295 tons of coal.

Senate Fuel Inquiry Continues

The Senate has approved an extension to June 30 of a study and investigation of U. S. fuel reserves being carried on by its Committee on Interior and Insular Affairs. Objective of the study is to formulate recommendations for a national policy on fuel conservation and utilization. The resolution setting up the inquiry called for the committee's report by the end of 1950, but the deadline was later extended to Jan. 31, 1951, and by the latest arrangement to June 30. An open "round-table" discussion of some 30 basic questions involved in the establishment of a national fuel policy was scheduled by the committee for early March, with about 15 representatives of the fuels and energy industries invited to participate. The committee plans formal hearings at a later date.

New Heads for Consol Divisions

The election of George R. Higinbotham and Charles R. Nailler as presidents, respectively, of Consolidation Coal Co. (W. Va.), and Christopher Coal Co., both Div. of the Pittsburgh Consolidation Coal Co., was announced Feb. 27. Messrs. Higinbotham and Nailler, who were formerly vice presidents in charge of operations for their respective companies, succeed William L. Doolittle, who retired March 1. Mr. Doolittle, who started his coal career in 1903, became president of the two companies in 1946.

Coal for New Utility Plants

Plans for the construction of a new power plant in Southern Illinois that will burn an estimated 2,000,000 tons of coal yearly recently were reported. The 625,000-kw plant will be built at Joppa, Massac County, by Electric Energy, Inc., St. Louis, an organization representing five private utility firms. Construction is to begin shortly, with completion of the project scheduled for 1953. Later, on Feb. 19, the Philadelphia Electric Co. announced that it would start construction June 1 of a new 150,000-kw generating station on the Schuylkill River near Phoenixville, Pa. The plant, which is to be equipped to burn either coal or oil, will be completed by October, 1953, and is expected to cost $27,000,000.

Colorado Power Project Sought

The Interior Department Jan. 31 revealed plans for the large-scale development of water and power resources in the five states of the upper basin of the Colorado River. Involving a cost of $1,139,000,000, the proposal provides for immediate construction of five of the 10 dams eventually planned and the installation of hydroelectric facilities with a capacity of 1,662,000 kw. States in the upper Colorado basin are Colorado, Utah, Wyoming, New Mexico and, to some extent, Arizona. Governors of the seven basin states have 90 days for study of the project, after which the report will be sent to Congress for authorization.

Hanna Aids Atomic Defense

The Hanna Coal Co. Div. of Pittsburgh Consolidation Coal Co., St. Clairsville, Ohio, is actively assisting in the organization and training of a civil-defense staff in its communities, it recently was reported. The company is sponsoring first-aid classes with an enrollment of about 2,500. The group includes 1,500 high school students, together with employees, teachers and residents. It also has made arrangements for large quantities of first-aid equipment to be available in case of an emergency. Also as a part of the program, Hanna recently sponsored, in cooperation with high schools in the area, a forum on "Health and Injury Hazards From Atomic Weapons." Representatives of the Mine Safety Appliances Co. conducted the session.

Island Creek Safety Record

The Island Creek Coal Co., Huntington, W. Va., recently reported that seven of its mines had produced more than 15½ million tons of coal since the last fatality. Output of the individual mines range from slightly over 1 million tons to almost 5 million tons.

Colorado Bill Cuts Tax on Gasoline from Coal and Shale

Motor fuel produced from oil shale and coal will be exempted from the 4c Colorado state gasoline tax under a bill passed by the state Senate late in January. The measure, which was strongly supported by leaders of both parties, was designed to stimulate the development of synthetic-oil plants in the state. It was yet to be passed on by the other body of the legislature.

More News Briefs on Page 168

PARIS MANUFACTURING COMPANY

Announces

THREE *NEW* DRILLS

The PARMANCO Coal Drill will drill 2¼ inch holes at a speed of up to six feet per minute in #5 coal. Equipped with heavy duty truck-type transmission and rear end and a complete hydraulic feed, the drill is operated by one man from the control seat. It is made in two sizes with a 12 h.p. or 25 h.p. gas motor and all units are completely self-contained and enclosed in oil-tight cases.

ALREADY USED by

Big Seam Collieries, Inc.	1	Enos Coal Co.	1
United Electric Coal Co.	6	Southwestern Ill. Coal Co.	1
Fairview Collieries Corp.	3	Truax-Traer Coal Company	2
Colonial Coal Co.	1	Refractory Fluid	
Little Sister Coal Co.	1	Harbison-Walker Refractories Co.	1
Hunt-Sinclair Coal Mining Co.	6	Mexico Refractories Co.	1
Sherwood-Templeton Fuel Co.	1	A. P. Green Fire Brick Co.	1

THIS UNIT IS DELIVERING 6-INCH SHOT HOLES — READY FOR LOADING at Better Than Two Feet a Minute ! ! !

The new PARMANCO Hi-Speed Horizontal Drill is completely redesigned around a 40 h.p. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time —a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.

PARIS MANUFACTURING COMPANY Paris, Illinois

COAL MEN ON THE JOB

FARLAND FUEL CO., Kathryn mine, Shinnston, W. Va.: Roy Hayhurst, section foreman; B. L. Starkey, mine foreman; Paul Gaydos and John Maston, section foremen.

BRETZ FUEL CO., Margaret No. 3 mine, Masontown, W. Va.: George Shaffer (front row, left), motor boss; Eddie Plum, track foreman; Joe Lawson, outside foreman; Alec Branney, superintendent; Elmer Smith (rear row, left), electrician; Ben Nicholson; Emery Auville, master mechanic; and Lloyd Feathers, general mine foreman.

UNDERGROUND TEAM AT PRICE NO. 1 MINE, Inland Steel Co., Wheelwright, Ky.: Robert England (left), section foreman; Leon Porter, mine foreman; Worley Mace, assistant foreman; Howard Holbrook, mine foreman; and Charles Luxmore, assistant foreman.

CONSOLIDATION COAL CO. (W. Va.), Williams mine, Shinnston, W. Va.: Willard Starcher (left), section foreman; E. B. Wilson, assistant general mine foreman; L. F. Kerns, safety inspector, Fairmont Div.; and William Minncat, section foreman.

IMPERIAL SMOKELESS COAL CO., Quinwood, W. Va.: W. L. Carneal (left), superintendent, Mine No. 3; William Kennedy, general superintendent; and Thomas Holbrook, general foreman, Mine No. 3.

RUPERT SMOKELESS COAL CO., Ball mine, Rupert, W. Va.: C. E. Small (left), conveyor foreman; Herman Holcomb, section foreman; and C. L. Blefield, general mine foreman.

The Defense Production Problem

To win out in the struggle for freedom into which the Russian Communists have plunged us we must do at least four things. We must:

1. Speedily carry through a program of defense production which, at its peak, is scheduled to take about one-fifth of our national output.

2. Pay for this program as we go, by methods that will enable us to maintain the effort for an indefinite period — as long as may be necessary to insure peace and security.

3. Manage intelligently and endure intelligently a set of direct government controls which, in certain critical departments, will put our national economy for a time in a hateful straight jacket.

4. See that these emergency controls are not fastened upon us permanently thereby presenting to our Soviet antagonists a major victory for collectivism on our home front.

This is the first of a series of editorials designed to present in the simplest terms these key aspects of our struggle to preserve our free institutions.

A Staggering Task

The magnitude of the defense production job staggers the imagination. Over the next year it calls for a larger volume of goods and services than the 20 million people of the states of New York and New Jersey will use for all purposes. The (London) TIMES has observed that, taken alone, the increase of defense expenditures which has been budgeted for the federal government's coming fiscal year (about $30 billion) "is in itself not far short of the total national income of the United Kingdom."

Yet so powerful is the production machine created by free American enterprise that, at the scheduled peak, the defense program will take only about one-fifth of our total national output. The exact form and dimensions of the program will, of course, be hammered out on the anvil of public and congressional debate. But the President's recent estimate of an annual rate of expenditure of $45-55 billion for defense by the end of this year may well turn out to be somewhere near right.

To meet even these vast requirements of defense production we are in better shape technically than we were when we started to prepare for World War II. Our industrial plant and equipment is greatly improved. Over $65 billion has been invested in it since V-J Day. Our working force is about eight million larger than it was ten years ago and much better trained.

The difficulty, and it is a very serious economic difficulty, is that we must fit the defense program into a productive machine that has been almost fully extended to meet the needs of a booming civilian demand. The present plan is to step up defense production during 1951 from about 7% to about 18% of our total national output. Because there is relatively little slack in our economy, this means that civilian production at the outset must

be cut back as defense production is stepped up.

The cut-back of civilian goods must be especially severe in the case of products made of metal. This is particularly true of goods that use scarce strategic metals such as aluminum and copper. Of our total defense production program, about half will go for "military hardware" – airplanes, guns, munitions, tanks and the machinery to make them. By the end of 1951 defense requirements are scheduled to absorb most of the metalworking production not required for essential construction and for the spare parts necessary to keep existing equipment running. For a time at least, there will be a sharp cut in the supply of new metal products available to civilian consumers. The defense squeeze on both materials and manpower will also cut sharply into housing and other civilian construction.

For the Short Run — Controls

In the short run there is no answer to the problem of meeting defense production schedules except controls. Sharp reduction of non-defense expenditures by government is essential and would help greatly. But the basic fact is that we cannot increase our total production fast enough to meet immediately both civilian and defense requirements.

Controls are needed, therefore, to switch resources from civilian to defense production, and at the same time prevent the combined demand for critical products from sending prices right through the roof. In the case of many scarce strategic metals such as nickel, copper and cobalt, the task of increasing output is especially difficult because our limited supplies are tucked away deep in the earth in many quarters of the globe.

For the longer pull – and that is what we must face – there is another answer to our defense production problem that is infinitely better than controls. And this time, in contrast to World War II, it is all-important that we get the right answer to our defense production problem for the longer pull and that we get it right now. In World War II we geared our economy to meet the requirements of a relatively short and decisive conflict. Now our leaders, however they may differ as to methods, are well agreed that, at best, "the conditions under which we labor may persist for ten, fifteen or twenty years." That is General Bradley's phrase.

For the Long Pull — More and Better Production

For this longer pull, the constructive answer to our problem of defense production is clearly more and more efficient production all along the line. It is true that overall we now have the most efficient industrial establishment in the world. But, even so, much of it is far short of attainable efficiency. Some plants using up-to-date equipment and methods are as much as six times more efficient than others in the same industry that are lagging in modernization.

Our Director of Mobilization, Charles E. Wilson, has clearly in mind this problem of increasing our industrial efficiency. The first step in his job, as he conceives it, is to get out an adequate supply of weapons to equip the army, navy, and air forces already mobilized or in process of organization by us and our allies. The second step is to make sure of our capacity to produce both "military hardware" to meet any increased requirements and the maximum possible volume of goods for civilian use.

In concentrating on more and more efficient production, Mr. Wilson is squarely on the beam. We can attain his objective – by sustained effort on the part of each one of us backed by up-to-date industrial methods and equipment.

If we do that, we can maintain indefinitely an adequate defense effort and at the same time enjoy a standard of living higher than any other in the world.

Additional production and more efficient production are our surest safeguards against our two most menacing enemies on the home front – the deadly inflation that can destroy our free economy, and the strangling government controls that can destroy our political freedom.

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COMPANY APPRECIATION of the accomplishments of the 116 foremen who supervised sections for 1 to 5 yr without an accident to crew members is expressed by Paul D. Ritter, Red Jacket president. Among those at the speakers table at the company's 5th annual banquet were: J. B. Benson (left), USBM; J. J. Plasky, training and safety director, and William M. Ritter, general manager; M. J. Ankeny and E. E. Quenon, USBM.

RED JACKET SAFETY LEADERS, who have supervised crews for 5 yr without a single lost-time accident were: Grover Bradford (left), Wyoming mine; Haywood Dean, Junior mine; and T. D. Jordan, Wyoming mine.

KEEN MOUNTAIN OFFICIALS, who helped win the annual Red Jacket Trophy for the best 1950 safety record among the company mines, are: D. W. Halstead (standing, left), assistant superintendent; Darrell Gillespie, general mine foreman, day shift; Joe Gillespie, general mine foreman, night shift; J. M. Hutchinson, J. H. Damron, assistant general mine foremen; and seated J. A. Damron, supt.

4 YR WITH ACCIDENT-FREE CREWS—Lewis Hardesty (standing, left), Junior mine; G. A. Neal, Wyoming mine; Charles Turk, Mitchell Branch mine; R. S. Dean (seated, left), Keen Mountain mine; Jones Kennedy, Junior mine; and Light Hatfield, Coal Mountain mine. Norman Presley, Keen Mountain, and Guy Barrett, Wyoming, were absent when the photo was taken.

116 Foremen Mark Accident-Free Records

THE RED JACKET COAL CORP. honored 116 of its foremen for their outstanding safety records at a dinner held Jan. 20 at the Mountaineer Hotel, Williamson, W. Va. Cited for supervising sections on which lost-time accidents did not occur for periods of 1 to 5 yr, each of the 116 men received a certificate attesting to his place on the company's 1950 Honor Roll.

During the 5 yr in which the company has held its annual dinners, its frequency rate has been reduced approximately 50% and its severity rate 56%. In the first year of the program, 22 foremen qualified for the accident-free Honor Roll.

Presentation of the Red Jacket Trophy for the best 1950 safety record among the company's mines also was a feature of the program. Paul D. Ritter, company president, presented the trophy to J. A. Damron, Keen Mountain superintendent, who accepted it for the mine personnel.

Guests of the company included a number of federal and state bureau officials and others. Speakers during the ceremonies were: Paul D. Ritter, president, William M. Ritter, general manager, R. A. Ison, assistant general manager, and J. J. Plasky, training and safety director, Red Jacket Coal Corp.; E. E. Quenon, USBM, Mt. Hope, W. Va.; J. B. Benson, USBM, Norton, Va.; M. J. Ankeny, Chief, Coal Mine inspection Div., USMB; Young Lawson, West Virginia inspector-at-large; and W. H. Bronson, Williamson city attorney.

Topping the Honor Roll were three men cited for 5-yr accident-free records: Haywood Dean, mine forman, Junior mine; J. D. Jordan, mine foreman, Wyoming mine; and Grover Bradford, assistant general mine foreman, Wyoming mine. Each was presented with an engraved electric clock and will have his expenses paid for a trip to Washington, D. C., early this summer, when mine foremen with outstanding records from all over the country meet on invitation of the NCA.

Certificates and tie clasps were

presented to the eight men who had supervised sections without a lost-time accident for 4 yr as *follows*: Lewis Hardesty and Jones Kennedy, Junior mine; Norman Presley and R. S. Dean, Keen Mountain; G. A. Neal and Guy Barrett, Wyoming mine; Charles Turk, Mitchell Branch mine; and Light Hatfield, an outside foreman.

The Honor Roll included 20 foremen with 3-yr records, 35 men in the 2-yr group and 49 foremen with 1 yr of accident-free supervision. White safety hats were presented to the 22 "honorable mention" foremen who had cleared their records after having one or more accidents on their sections during the year. Men with 1-, 2- and 3- yr records were:

3 Yr With Accident-Free Crews—Keen Mountain mine: A. K. Hooker, Ed Steele, Leonard Skeens, Luther Dillon, W. O. Bohon and Lester Mabe; Mitchell Branch: Homer Mahone, Jerry Ison, C. L. Eanes, Howard Radford and E. K. Toler; Wyoming: T. E. Sizemore, Tommy Bailey, Dan Winters and Fred Shannon; Junior: Dayton Johnson, Mont Howell and Sephas Wicker; Coal Mountain No. 12: Joe Browning; Coal Mountain outside; Don Shields.

2 Yr Without Accidents—Keen Mountain: Roy Thompson, Henry Hill, George Thomason, Harry Danielson, W. W. Harlow, Curt Matney, Evan Edwards, Frank Stout and Joe Henderson; Junior: Jim Backus, A. L. Preston, Dave Ratliff, George Spears, Estil Keith, George Williamson Jr. and Grant Henson; Coal Mountain No. 9: Orville Godfrey and J. P. Florio; Mitchell Branch: Jim Martin, H. B. Artis, Lonnie Hamby, Arson May, Claude Meade and Amos Williamson; Coal Mountain No. 12: Charles Thompson, Ted Morgan, J. B. Staten and Elmer Blizzard; Wyoming: Hulen Mullins, Oley Stewart, Ira Bradford and Herbert Short; Outside: Lawrence Hatfield, Harry Davis and Frank Mosolgo.

1 Yr Without an Accident—Junior mine: Frank Melmige, Bill Roberson, Oscar McCoy, Russell Williamson, Kenneth Smith, John Halley, Bill DeHart, Nathan Maynard, W. D. Brown, Bill McClure, Nakomis Sloan, Joe Hatfield, Tom Ramey, Walter Asbury and Ed. Simpkins; Wyoming: Dale Browning, James Hilton, Bill Lester, Carl Mace, Ed. Riddle, Carl Parks, Ralph Phillips, Denver Ellison, Pat Leslie, Tommie Short and John Miller; Keen Mountain: Arvis Wells, L. E. Ratliff, H. H. Jones, C. L. Dorton, Arthur Joyce, Roger Hooker and Dexter Vance; Mitchell Branch: Cleve Mitchell, Jim Hammond, W. R. Hoskins, Bill Curry, Ralph Staten, Fred Sears, Herbert Williamson, and Watson Pemberton; Coal Mountain No. 9: Gussie Morgan, Floyd Barnett, Quinton Belcher, George Ritter and Charlie Cox; Coal Mountain No. 12: Bill Dunn and Freelan Browing; Outside: Jim Maynard.

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Personal Notes

Several changes in personnel of the Clinchfield Coal Corp., Dante, Va., have been announced by E. F. Wright, Jr., general superintendent. **R. T. Huffman**, superintendent of Meade mine, has been transferred to a group of mines in the Beckley area as general superintendent. **Irwin Sampson**, formerly assistant superintendent, has been named superintendent at Meade mine, to succeed Mr. Huffman. **Charles Lyttle** has been promoted to assistant superintendent and **Leslie Clark** to general mine foreman. **A. L. Flowers**, formerly assistant superintendent at Moss mine, has been transferred to Dante as assistant mining engineer. **P. P. Ferretti**, production engineer, has been appointed to replace Mr. Flowers, and **William Maratta** has succeeded Mr. Ferretti.

Lehigh Valley Coal Co., Wilkes-Barre, Pa., has announced the appointment of **Thomas C. Price**, formerly superintendent of the Prospect colliery, to the newly created post of district superintendent. **Herbert C. Griesing**, superintendent, Westmoreland colliery, and **Harry Spare**, superintendent, Franklin colliery, have been transferred to the company's engineering department to fill vacancies caused by the retirement of **John Haertter** and **David Davis**. **Jacob Miller** has been advanced from mine foreman to superintendent at the Westmoreland colliery, succeeding Mr. Griesing. **George Collamer**, formerly field engineer and trouble shooter, has been named superintendent at Franklin colliery, replacing Mr. Spare.

J. W. Woomer, consulting mining engineer of Pittsburgh, Pa., and Wheeling, W. Va., is spending several weeks in France and Germany observing potash mining and metallurgy practices on assignment for the Southwest Potash Corp. of New York City.

L. Rodman Page, of the Crozer Coal & Land Co., recently was honored at a dinner given by the foremen and other officials connected with the company's operation at Elkhorn, W. Va. Mr. Page, who will be associated in the future with the company's sales department, was presented with a leather traveling case by the group.

George A. Stachura, formerly safety engineer, Harwick mine, Duquesne Light Co., Harwick, Pa., has been appointed underground superintendent of the new Orient mine, Chicago, Wilmington & Franklin Coal Co., Waltonville, Ill. **Maurice E. Fowler** has been promoted from faceboss to succeed Mr. Stachura at Harwick mine.

E. B. Dangerfield, superintendent, Majestic No. 14 mine, Peabody Coal Co., Duquoin, Ill., retired Jan. 13, his 71st birthday. **Robert Anderson**, mine foreman at Majestic No. 14, has been named to succeed Mr. Dangerfield as superintendent. Mr. Dangerfield first came to Southern Illinois some 50 yr ago. From his first position as a loader with the Big Muddy Coal & Iron Co., he worked up through the ranks to hold supervisory positions in various mines in the area. He had been an operating official at Majestic No. 14 for the past 21 yr.

William Hardy, superintendent of Peabody Coal Co. Mine No. 58 since 1922, retired Jan. 1 at the age of 72. **James E. Edwards**, mine foreman at Mine 58, has been made superintendent to succeed Mr. Hardy. With Peabody for 37 yr, Mr. Hardy was appointed superintendent of Mine 58 the year after it was acquired by the company. The Joseph A. Holmes Safety Award has been presented to the mine twice since 1941, once for producing 7 million tons without a fatality from 1941 to 1947. Mr. Hardy's only son, John, is superintendent of the company's No. 9 mine.

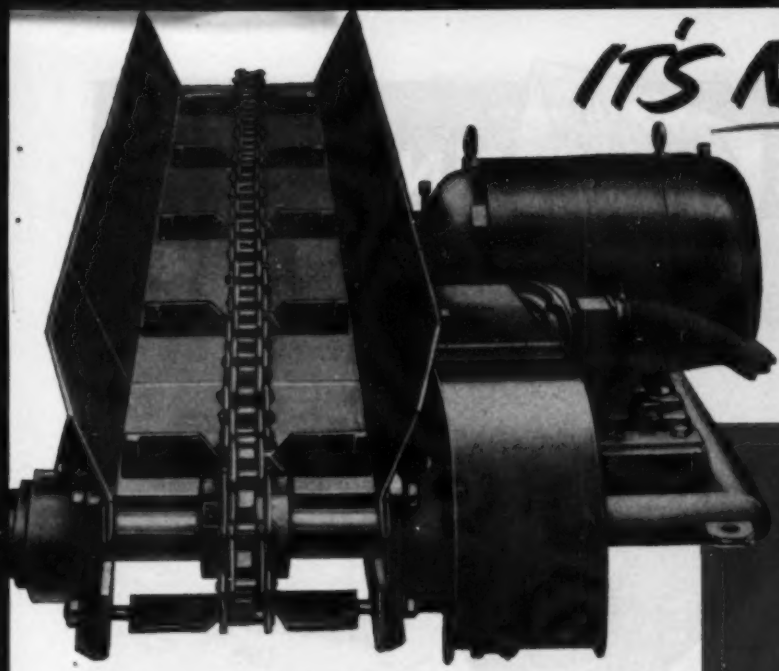
Irvin Davis, president of the Hatfield-Campbell Creek Coal Co. until the company was sold last fall, is to be named a consultant in the coal and fuel division of the Cincinnati Office of the Price Stabilization, it was reported last month.

Personnel of the new Mt. Hope, W. Va., field office recently established for the newly created Industrial Relations Department of the EG&FA Coal Division has been announced by D. C. Stewart, manager of the department, which has headquarters in Pittsburgh. **C. R. Stahl**, labor relations manager, will head the Mt. Hope office, with **S. H. Thatcher**, formerly general superintendent of the Keystone, Carswell and Maitland mines, serving as assistant labor relations manager. Others with headquarters in Mt. Hope include **W. A. Wilson**, training superintendent for mine supervisory personnel, who also will assist in the development of mine vocational guidance programs in EG&FA community schools; **Luther T. Powers**, field employment manager; **R. G. Kirby**, workmen's compensation manager; and **Flo B. Canterbury**, acting supervisor of nurses for the Home Nursing Service. **Virgil M. Beckett**, welfare manager, and **Robert A. Button**, personnel manager, will have headquarters in Pittsburgh.

Glenn V. Bearden, general superintendent, Peerless Coal & Coke Co., Vivian, W. Va., has in addition been named general superintendent of the Nassau Coal Co., a subsidiary of Peerless Coal & Coke operating the Black Wolfe No. 1 mine at Black Wolfe, W. Va. **Walter E. Bailey** has been appointed general mine foreman at Black Wolfe No. 1 mine. **Fred Hubbard**, superintendent at Black Wolfe, has resigned to become assistant general manager of the Utah Fuel Co., Salt Lake City, Utah.

D. Clinton Helms, general manager since 1947 of the Lehigh Navigation Coal Co., Inc., Lansford, Pa., has been elected a vice president, according to an announcement by Evan Evans, company president. In his new posi-

"LOOK J.D. - I HAVE A LOADING MACHINE HERE AND ANOTHER LOADING MACHINE RIGHT THERE - NOW WHEN I LOAD THIS OUT THIS MACHINE MOVES THROUGH THIS CHUTE AND... ETC. ETC."



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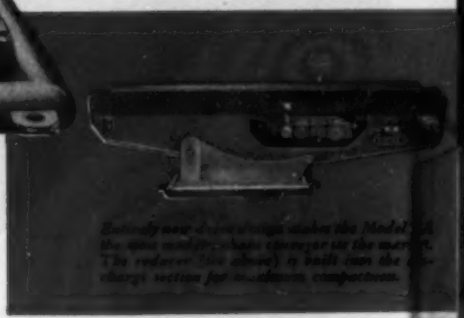

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MEETINGS

- ASME: spring meeting, Apr. 2-5, Atlanta-Biltmore, Atlanta, Ga.
- Canadian Institute of Mining and Metallurgy: annual meeting, Apr. 9-11, Chateau Frontenac, Quebec.
- National Coal Association: annual meeting, April 19-20, Waldorf-Astoria Hotel, New York City.
- Ninth Annual Anthracite Conference: May 4, Lehigh University, Bethlehem, Pa.
- American Mining Congress: coal convention and exposition, May 14-17, Public Auditorium, Cleveland.
- Mine Inspectors' Institute of America: 41st annual convention, June 4-6, Phoenix Hotel, Lexington, Ky. For information, write C. A. McDowell, secretary, 427 Park St., California, Pa.
- Rocky Mountain Coal Mining Institute: annual meeting, June 7-9, Hotel Utah, Salt Lake City, Utah.
- Stoker Manufacturers' Association: annual meeting, June 25-26, South Shore Inn, Lake Wawasee, Syracuse, Ind.

tion, in addition to continuing his duties as general manager, Mr. Helms will be particularly concerned with the long-range production planning and development of Panther Valley mines. Joining the Old Company in 1909, Mr. Helms has held various engineering and supervisory posts throughout the organization, serving as superintendent of several of the company's districts from 1922 until he was appointed mining engineer in 1937. In 1946 he was named production manager and was made general manager in December, 1947.

Thomas E. Lightfoot, director of welfare and insurance, Coal Division, Eastern Gas & Fuel Associates, retired Feb. 1 from his insurance duties. Now rounding out 25 yr of service with the company, Mr. Lightfoot will continue to give his attention to the two summer recreation camps for EG&FA mineworkers which he founded. From the first camp handling 70 children when it was established in 1936, his idea has grown to two camps accommodating nearly 900 children each summer. During the summer months Mr. Lightfoot will reside in a new home he has built near the Camp Thomas E. Lightfoot property where he will be in close contact with activities at this camp for white children, as well as only a few miles from Camp Washington Carver for negro children near Beckley.

Forrest O. Calhoon has been elected president of the Disco Co., a division of the Pittsburgh Consolidation Coal Co., and also an assistant vice president of the parent company, succeeding Carl E. Lesher, who recently retired. Mr. Calhoon joined Disco as as-

at the working face . . .

GIVE 'EM AIR

at the lowest possible cost!

Above ground it's free, but down in the bowels of the earth, where men mine the pay-lode or build tunnels for the benefit of humanity, *AIR* and its *DELIVERY COST* are vital factors.

SPIRATUBE-M and AYRTUBE cut Air *Delivery Costs*. Made specifically for mine and tunnel ventilation, these two new *AIRDUCTS* working individually or in combination, deliver a maximum cubic measure of air right at the working face and at the lowest possible cost—because—ease of handling reduces installation costs, and construction features minimize leaks and seepage. You get the full volume created by your fans and blower units right where you need it—at the working face—reducing power costs.

Immediately available in tough high count jute and other fabrics, all specially treated and heavily coated inside and out to withstand fungus and mildew and rough usage.

Extremely flexible special (patented) built-in couplings eliminate fabric mangling—parts are never laying about to create accident hazards.

SPIRATUBE-M and AYRTUBE save labor—cut fatigue—step up output—cut maintenance costs.

SPIRATUBE-M — (DIAMETERS to 30 INCHES) Especially designed for both positive and negative pressure, or reversible systems. Replaces rigid ducts. Offers great savings in shipping, installation, maintenance, and storage costs. Patented concealed spring wire construction springs to work and stays extended. Built-in quick couplings with joints lock ringed against blast concussion. No fittings required for turns or bends.

AYRTUBE — (DIAMETERS to 36 INCHES) Heavy duty pressure ventilation tubing without wire reinforcement. Quick coupling ends and lock rings interchangeable with SPIRATUBE-M. Materials and constructions meet Flexible Tubing Standards. Full line of special fittings available.

Flexible Tubing Corporation, Guilford, Conn.—Dept. B

Send us more information. Spiratube-M ☐ Ayrtube ☐

FLEXIBLE TUBING CORPORATION — SPIRATUBE — GUILFORD, CONNECTICUT, U.S.A.

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Now— simplify tough PULLING jobs!

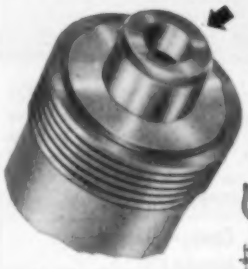
(Save the tool cost in one operation!)

New—7 Complete Units • 10 to 100 Tons Capacity

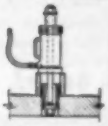
SIMPLEX Re-Mo-Trol Hydraulic "Center-Hole" PULLERS

PUMPS AND REMOTE CONTROLLED RAMS

It's the "Center-Hole"* That Does the Job



An exclusive Re-Mo-Trol improvement! Ram plunger is tubular. A pull rod or screw inserted through the ram and secured to object being pulled is drawn in a straight line *directly through* the Ram—simplifies rigging and provides its own back-up.



Removing sleeve with Re-Mo-Trol, using supporting cage, pulling screw and back-up washer. Direct pull quickly draws sleeve from cylinder.

*On Rams of 30-tons or greater capacity.

DIRECT LINE PULL
No torque or side thrust. Requires up to 75% less effort—lets you do bigger, harder pulling jobs easier.

FEWER FIXTURES NEEDED
Simplifies rigging. The Re-Mo-Trol Ram acts as its own back-up and is self-supporting.

SAFER, HANDIER POWER
Operator is always at safe distance. Re-Mo-Trol can be used where lack of space or difficult positioning prevents use of self-contained jacks or pullers.

GREATER UTILITY
Light in weight, easily portable. Operates in any direction—up, down or sideways!

Simplex LEVER • SCREW • HYDRAULIC Jacks

Write for Bulletin: Hydraulic 51

TEMPLETON, KENLY & CO. • 1040 S. Central Avenue, Chicago 44, Illinois

sistant to the president early in 1948 after more than 20 yr of experience in the manufacture of tar products and industrial chemicals. He was advanced to vice president last year.

Eastern Gas & Fuel Associates has announced several changes in supervisory personnel. **Henry Bowers** has been appointed general night foreman at Federal No. 1 mine, succeeding the late **J. W. Jones** who, prior to his death in December, had served as an official at Federal No. 1 for over 25 yr, the last 17 as general night foreman. **E. F. King** has been employed as section foreman at Wharton No. 1 mine and **Ernest Cales** has been promoted to foreman at Wharton No. 2. At Kopperston, **Carl Payne**, conveyor loader at No. 1 mine, and **T. W. Powell**, cutting-machine operator at No. 2 mine, have been advanced to section foremen.

Obituaries

Dawson Coleman, 61, chairman of the board of the Ebensburg Coal Co. and Coleman & Co., Philadelphia, died Feb. 8 following a heart attack in his hotel room in Macon, Ga. A prominent sportsman, Mr. Coleman had been president of the National Field Trials Club for the past 3 yr and was in Macon to attend the annual shooting dogs' field trials at the time of death.

E. H. Weitzel, 82, vice president and general manager of the Colorado Fuel & Iron Co. from 1914 until his retirement in 1928, died recently in Long Beach, Calif.

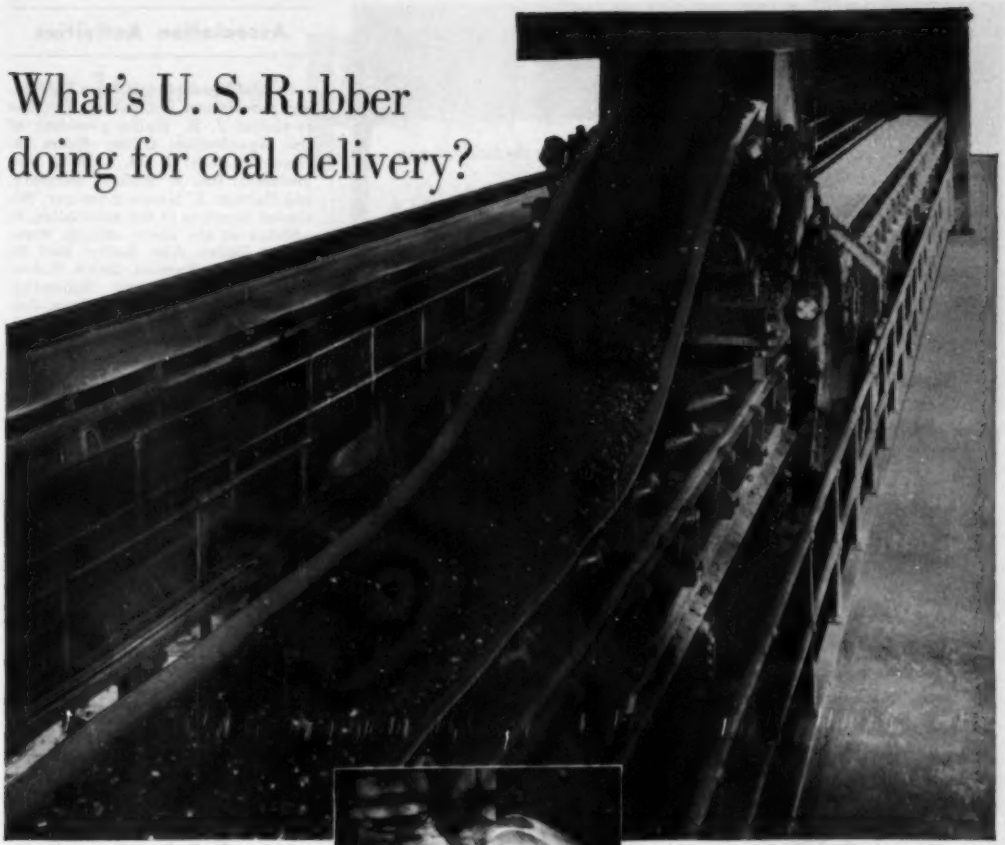
Franklin K. Day, general superintendent, Pardee & Curtin Lumber Co., died Feb. 18 at his home in Webster Springs, W. Va., following a heart attack. Mr. Day had been in ill health for some time and a few days before his death had been discharged after treatment from a Clarksburg, W. Va., hospital. Before joining Pardee & Curtin in 1930, Mr. Day had been associated with Consolidation Coal Co. (W. Va.).

John D. Kinstler, 61, an Illinois state mine inspector, died suddenly Feb. 8 at his home in West Frankfort, Ill. Mr. Kinstler had been a resident of the area for more than 35 yr.

Ralph D. Pomeroy, 79, who retired last year as vice president of the Utah Fuel Co., died Feb. 5 at his home in Salt Lake City of a heart ailment. Mr. Pomeroy joined Utah Fuel in 1903 and was named a vice president in 1944.

Fred Heien, 58, general superintendent, Forsyth-Williamson Coal Co., Carterville, Ill., died Feb. 4 in his office following a heart attack. Mr. Heien had been superintendent at the Forsyth-Williamson property for the past 11 yr.

What's U. S. Rubber doing for coal delivery?



THIS NEW U.S. CONVEYOR BELT (above) 42 inches wide, 1,984 feet long, weight 18 tons, replaced the earlier "U.S." belt that had been 21 years on the job. The original belt traveled 231,818 *miles*, almost equivalent to a trip to the moon, before being replaced.

SPLICING ON THE JOB is a U. S. Rubber specialty. It took the man on the left and his fellow-workers 12 hours to install the belt – a record-breaking time—thanks to the cooperative planning between the "U.S." engineers and the operator.

THE OLD U.S. CONVEYOR BELT traveled this near-1000 foot runway at a rate of 360 feet per minute – delivered over 17 million tons of coal – gave continuous trouble-free service in its long history.

"U.S." makes conveyor belts that last longer. This particular belt installation in a mid-west electrical generating plant replaced a 21-year-old belt that had a record run of service. It can be fully expected to give an even finer performance.

The technical progress made by United States Rubber engineers in belt construction is enabling mine operators and coal handlers to increase output and decrease their operating costs. Your materials-handling problem is never too big or complex for "U.S." belting specialists. Contact them through the address below.

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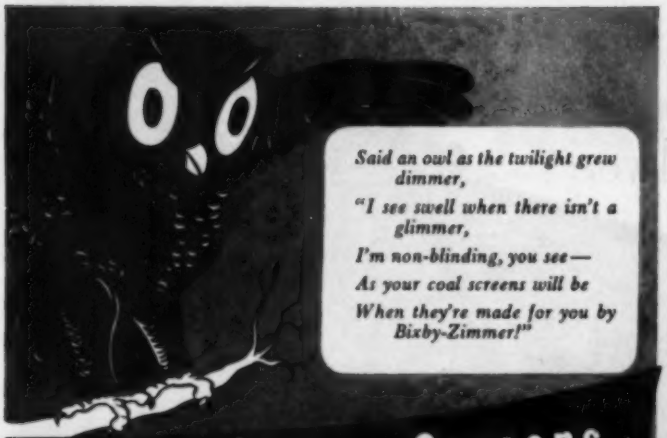
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.


Said an owl as the twilight grew dimmer,
"I see swell when there isn't a glimmer,
I'm non-blinding, you see—
As your coal screens will be
When they're made for you by Bixby-Zimmer!"

Non-Blinding Screens make money for you!

When your coal screens without blinding, you're money ahead. That's why more Bee-Zee Round Rod Screens are bought for coal processing work than for any other job . . . why coal operators re-order Bee-Zee Screens again and again.

COAL CAN'T CLOG . . .

because the smooth, round top and tie rods touch at only one fine point of contact. There are no "pockets" or "blind spots" for even the smallest pieces of coal to collect. This fine point of contact means more thorough dewatering, too.

SCREENS STAY ACCURATE . . .

because Bee-Zee's exclusive round rods keep the original screen opening even *with as much as 50% wear.* Coal operators report that Bee-Zee Screens last 10, 20 — even 30 times longer.

SCREENS TAKE PUNISHMENT . . .

because Bee-Zee stainless steel resists rust, corrosion and abrasion . . . all-welded construction withstands pounding . . . built-in tension absorbs high stress and strain.

SCREENS FIT ANY PLANT . . .

because Bee-Zee Screens are "custom engineered" for installation on any make or model of coal processing equipment, in any size, shape, mounting or dimension.

ROUND ROD *Screens*

VALUABLE SCREEN INFORMATION — Write for the complete Bee-Zee catalog, explaining all the features of Bee-Zee Round Rod Screens and their use in coal processing. No cost or obligation.

BIXBY-ZIMMER ENGINEERING CO.
130 ABINGDON STREET, GALESBURG, ILLINOIS

Association Activities

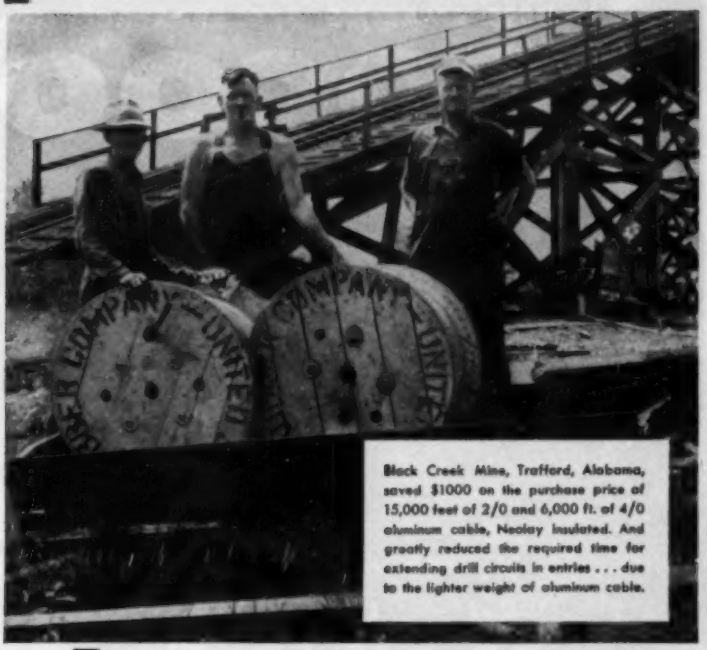
Central Pennsylvania Open Pit Mining Association, Philipsburg, Pa., has re-elected J. H. Wallin president of the organization. Other officers re-elected include: B. M. DuBois, vice president; Ray S. Walker, secretary, and Herman S. Moore, treasurer. Re-elected directors of the association, in addition to the above officers, were: Robert Bailey, Alex Bailey, Earl M. Brown, J. J. Earnest, Ralph Kuhns, Everett Moore, Joseph Radomsky, O. T. Shingledecker, Lewis Stein, Joseph Waroquier and Frank B. Wood, Sr. G. Albert Stewart was retained as executive secretary and Frank A. Whitsett as counsel.

Southern Appalachian Coal Operators' Association, at a meeting held in Knoxville, Tenn., Jan. 30, elected Charles R. Griffith president, succeeding the late Lee C. Gunther. Mr. Griffith is president of the Southern Coal & Coke Co. Other officers of the association are: B. E. Cheely, first vice president; D. E. Griffith, second vice president, and C. W. Davis, secretary.

Logan Coal Operators' Association has elected John J. Foster, vice president, Island Creek Coal Co., president of the organization, succeeding Arthur Downing. W. W. Beddow was named vice president and H. A. McAllister and J. W. Colley were re-elected executive director and secretary-treasurer, respectively. Elected members of the executive committee at the meeting held in Huntington, W. Va., Jan. 13, in addition to Mr. Foster, were: R. E. Salvati, president, Island Creek Coal Co.; H. E. Jones, Logan County Coal Corp.; G. J. Stollings, Powellton Coal Co.; J. A. Kelly, Guyan-Eagle Coal Co.; S. B. Johnson, Jr., Lorado Coal Mining Co.; O. G. Schwant, Hutchinson Coal Co.; T. R. Workman, West Virginia Coal & Coke Corp.; Dr. J. K. Heatherman, Jones & Heatherman Coal Co., and A. P. Boxley, Eastern Gas & Fuel Associates.

Somerset County Coal Operators' Association, Somerset, Pa., elected the following officers at its annual meeting held last month: president, Thomas Barnes II, The Bird Coal Co.; vice president, E. A. Siemon, Hillman Coal & Coke Co.; and treasurer, C. B. Berkey, Jr., Wilbur Coal Mining Co. Martin L. Markel was named to his 18th consecutive term as secretary and commissioner of the organization. Elected directors, in addition to Messrs. Barnes, Siemon and Berkey, were: L. A. Talbott, Baker-Whitely Coal Mining Co.; E. M. Custer, Hiram Swank and Acosta-Gray companies; Charles A. Merrill, Enterprise Coal Mining Co.; J. F. Neilan, Black Beauty Coal Co.; C. C. Dovey, Cambria Fuel Co.; E. J. Saxman, Saxman Coal & Coke Co.; and W. J. B. Mayo, Eastern Gas & Fuel Associates.

For lower cost power cable



Black Creek Mine, Trafford, Alabama, saved $1000 on the purchase price of 15,000 feet of 2/0 and 6,000 ft. of 4/0 aluminum cable, Neolay insulated. And greatly reduced the required time for extending drill circuits in entries . . . due to the lighter weight of aluminum cable.

figure it in aluminum

For power and feeder cable, borehole cable, any cable up to 2,000,000 cm, you'll save money when you specify aluminum. It costs less to buy; costs less to install. Its lighter weight reduces cost of suspension. For names of manufacturers, call your near-by Alcoa sales office (look under "Aluminum" in your classified telephone directory). ALUMINUM COMPANY OF AMERICA, 1779C Gulf Building, Pittsburgh 19, Pennsylvania.

• • •

Although the rearmament program prevents unrestricted sale of aluminum, we are ready to help you with the planning required for mine projects involving electrical wiring. Get the facts! Write for "Questions & Answers About Aluminum Conductors and Installations".

Insulated **Aluminum Conductors**

ALCOA

of ALCOA EC ALUMINUM are made by leading manufacturers

You've heard about our original COCOON—it's the tough, waterproof, acid-proof sprayable plastic that has been used by the Army and Navy to "wrap up" everything from B-29's to battleships.

Now a special version of COCOON—G. E. COCOON, is proving highly useful in mine stopping applications, providing a flexible, continuous seal which can be applied quickly, without special skills. Get the whole COCOON story—write today for details.

HERE'S HOW G. E. COCOON IS USED

- For Temporary Stoppings on Brattice Cloth
- For Dry Walls of Concrete Block
- For Repairs of Cracked Concrete Walls or Broken Overcasts
- For Roof and Ribs to Prevent Spalling

AND HERE ARE SOME OF THE *BIG* ADVANTAGES OF G. E. COCOON

1. More effective sealing makes ventilating systems more efficient—cuts operating costs of fans and pumps.
2. Saves money by facilitating recovery of stopping materials (G. E. COCOON can be reused many times).
3. Is absolutely non-toxic—can be sprayed in confined areas without masks using standard pressure spraying equipment.
4. Acid and moisture-proof; will not mildew or rot.
5. Recommended spraying equipment includes 2-wheel, mobile air compressor. Weight 275 lbs.—L. 26", W. 17", H. 24".

COCOON is

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COCOON ENGINEERING DIVISION
R. M. HOLLINGSHEAD CORP.
Camden 2, New Jersey
LEADER IN MAINTENANCE CHEMICALS
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See It for Yourself!

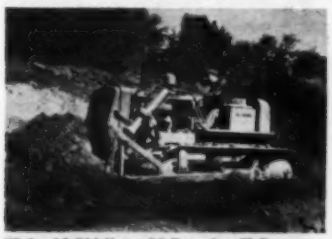
Let our engineers recommend a G. E. COCOON application to meet your specific problem. Demonstrations and training courses for your men can be arranged at our Camden offices and, in many instances, at your own mines. Write for information.

OUT AHEAD

with GM DIESEL POWER!

HD-20—41,800 lbs. of properly balanced weight; long, wide sure-gripping tracks and the new GM 6-110 Diesel engine driving through hydraulic torque converter give the Allis-Chalmers HD-20 brute strength to take toughest jobs in stride.

HD-15—27,500 lbs.—102 Drawbar H.P.—powered by a 6-cylinder GM Series 71 Diesel engine.



HD-9—18,500 lbs.—70 Drawbar H.P.—powered by a 4-cylinder GM Series 71 Diesel engine.

General Motors 2-cycle Diesel engines supply the hard-hitting power that enables Allis-Chalmers' great new line of tractors to outwork all others.

Four and six-cylinder GM Series 71 engines driving the HD-9 and HD-15—and the powerful new GM 6-110 engine driving the HD-20—give these new tractors a reserve of smooth, dependable power for easy handling, increased work and minimum maintenance.

The greater efficiency of 2-cycle operation and direct fuel injection simplifies design and enables these engines to produce far more horsepower than other Diesels of equal size and weight. Interchangeability of Series 71 engine parts provides maximum availability—keeps them on the job.

That's why GM Diesel engines are chosen to power not only the "World's most modern line of crawler tractors"—but more than 500 different kinds of machinery built by 120 manufacturers.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 275 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS... Up to 600 H.P.

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK

GM GENERAL MOTORS DIESEL POWER

. . . Hewitt-Robins Vibrating Screens Process Them All!

Take a look at that big brute of a machine. It's a vibrating screen—a Hewitt-Robins Heavy Duty Scalper.

The big rock you see on its deck is a 3′ x 2′ x 1½′ lump of ore weighing about 1100 pounds. The Scalper handles loads like this at 1000 tons an hour. Yet, it absorbs those loads—and its own vibration—so completely that a coin placed on edge on the base beams will stand up without toppling over *while the machine is running!*

The same company that makes this big brute also makes a small screen called a Ceramic Slip Lawn. This lawn is so precise in action, so effective in operation, that it finds and removes tiny specks of impurities—about ½ pound in every ton of material—from clay slip for pottery plants.

Think of that range—from 1100 lb. rocks to tiny specks! It's the best proof of all that Hewitt-Robins can satisfy *your* vibrating screen demands!

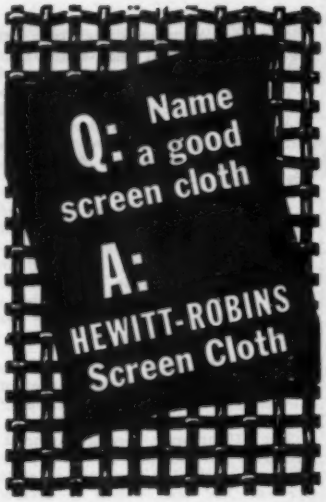
Just look at these facts: Hewitt-Robins originated the circle-throw principle for vibrating screens. Hewitt-Robins created the elliptical throw. Hewitt-Robins pioneered in both 4-bearing and 2-bearing vibrators. Hewitt-Robins introduced the full-floating principle of vibration-absorption.

Whatever you want in vibrating screen equipment, you can *safely* rely on Hewitt-Robins. Tell us your needs; we will supply the answer. Write to Robins Conveyors Division, 270 Passaic Ave., Passaic, N. J.

HEWITT-ROBINS
VIBRATING SCREENS

HEWITT-ROBINS (HR) INCORPORATED

BELT CONVEYORS (*belting and machinery*) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS



BECAUSE you increase the time between screen cloth changes—on *any make* of screen!

BECAUSE Hewitt-Robins Screen Cloth is made of Super-Gyraloy, the specially blended alloy steel wire that's the toughest, hardest screening surface ever developed.

BECAUSE its heat treatment and micro-structure make Super-Gyraloy highly resistant to abrasion without sacrificing ductility. You can actually bend a wire of this cloth around its own diameter without fracture.

BECAUSE Hewitt-Robins Super-Gyraloy Screen Cloth comes in the *weave* you want . . . the *size opening* you need.

SEND TODAY for Bulletin No. 113-A. Fully describes Hewitt-Robins Super-Gyraloy Screen Cloth, 3/16" to 6" openings, made from #12 gauge wire to ⅝" rod in square and rectangular openings, flat top and nonblind weaves. Also in Gyraloy (spring steel) stainless steel, Monel metal, brass or enamel coated in any standard diameter of wire. Robins Conveyors Division 270 Passaic Ave., Passaic, N. J.

HR

HEWITT-ROBINS

SCREEN CLOTH

Among the Manufacturers

Charles L. Bowman, 67, president and treasurer, Bowdil Co., Canton, Ohio, died Jan. 30 in the Aultman Hospital, Canton. Well known throughout the coal industry, Mr. Bowman had spent his working years from an early age in the development and manfacture of mine doors and Bowdil coal bits. He left school to help his father, the late Newton K. Bowman, in his sawmill and lumber yard and had learned the carpenter's trade by the age of 15. After his father and Charles Vignos had organized the American Mine Door Co., Mr. Bowman sold and installed mine doors up until 1915, when he became a director and assistant manager of the company. In 1923, he joined his father in the development of the Bowdil bit, becoming general manager of the newly organized Bowdil Co. On the death of his father in 1934, Mr. Bowman became president and treasurer. Under his direction, the company was moved to Canton and its plant area and facilities greatly increased to meet increasing demands for its products. His son, Floyd T. Bowman, is assistant manager of the Bowdil Co.

Frederick H. Lindsey has been elected executive vice president of Connellsville Mfg. & Mine Supply Co., Connellsville, Pa., in charge of production, engineering and sales. Mr. Lindsey has been active in the Pittsburgh district for the past 25 yr and has served as a manufacturers' agent in that area for the past 6 yr. In his new post, Mr. Lindsey also will supervise the company's current plans to expand its facilities and produce a number of new products designed for use by the mining industry.

Varied personnel changes, necessitated by expanding activities, have been announced by Kennametal Inc., Latrobe, Pa. Alex G. McKenna has been named executive vice president; John C. Redmond, formerly research director, vice president in charge of metallurgical development; and Richard J. Flickinger, assistant secretary. Bennett Burgoon, Jr. has been appointed assistant to the general sales manager, W. D. Turnbull. Gilbert Bunn, manager of the Philadelphia-New York district for the last 3 yr, has been made manager of the Detroit-Cleveland district, to succeed Mr. Burgoon. Douglas C. Cunningham, formerly representative in the Detroit district, has been appointed manager in the Philadelphia-New York district.

Joy Mfg. Co. has named Frederic W. Thomas director of purchases, and George R. Fox, formerly head of purchasing, assistant to the executive vice president in charge of the company's plant expansion program. Mr. Thomas has a background of 27 yr of industrial sales and purchasing experience and comes to Joy from Worthington Pump & Machinery Corp., where he has been general manager of purchases. With Joy since 1945, Mr. Fox has served as works manager of one of the company's plants and since 1949 has been director of purchases.

W. G. Miller has been appointed manager of manufacturing for Westinghouse Electric Corp.'s Motor and Control Div., Buffalo, N.Y. Mr. Miller, who joined Westinghouse in 1933, and has been serving recently as assistant works manager, will have charge of all manufacturing operations, except in the copper department and factory service.

Link-Belt Co., Chicago, has announced that Charles W. Beauchamp, formerly assistant sales manager, Ewart plant, Indianapolis, silent chain drives, has been appointed assistant sales manager, Ewart plant, for both silent and roller chain. H. Merrill Bowman, formerly assistant sales manager at the company's Pershing Road plant, Chicago, has been appointed assistant sales manager, Ewart plant, for Ewart general products. Andrew K. Kolar, formerly district manager at Moline, Ill., has been made assistant sales manager for Pershing Road plant products. Stuart T. Penick, previously district engineer at Dallas, Tex., has been transferred to Moline to succeed Mr. Kolar.

General Electric Co., Schenectady, N.Y., has announced a number of changes in personnel in its motors divisions. Elliott Harrington has been appointed vice chairman and secretary of a newly-established Defense Projects and Priorities Committee of the GE Small and Medium Motor Div. and has been succeeded as manager of the Induction Motor Sales Div. by R. S. Walsh, assistant manager of the division for the past 1½ yr. Francis J. Boucher, staff assistant to the manager of manufacturing for the GE Small Apparatus Div., has been appointed manager of manufacturing of the Small and Medium Motor Div. D. S. MacDonald, assistant to the manager of the Gear Motor Sales Div., has been named sales manager of a newly-created gear-motor section of the Gear Motor and Packaged Drive Div. of the Small and Medium Motor Div. C. B. House, Jr. and Lee J. Mohler have been appointed sales managers of two newly established product line sections in the Small and Medium Motor Div. and will head respectively, the ac motor section and the dc motor and generator section of the Lynn (Mass.) Motor Sales Division. In the Large Motor and Generator Div., George P. Patteson has been appointed assistant to the manager of sales. Concurrently, Ralph B.

These Liner Plates "GET DOWN TO BUSINESS" IN A HURRY

When your business is underground, it pays to reach "pay dirt" quickly and economically. This is why Armco Liner Plates are getting the call more and more often from coal mining men.

Armco Plates have corrugated metal design to provide great strength without excess weight or bulk. They are easy to handle and install. One man can carry, hold and bolt a section into place with a simple hand wrench. The job moves fast and costs are low.

Other advantages include fire-resistance and freedom from excessive maintenance.

Use Armco Liner Plates for sloped or vertical entries, air shafts, and wherever else you need the protection of a steel liner. There is a size and gage for every requirement. Write for complete information. Armco Drainage & Metal Products, Inc., 2391 Curtis St., Middletown, Ohio. Subsidiary of Armco Steel Corporation.

Export: The Armco International Corporation.

ARMCO LINER PLATES ARMCO

Bodine has been made manager, and **Robert M. Easley**, assistant to the manager, of the Large Generator and Convertor Sales Div. The appointment of Insulation & Wires, Inc., St. Louis 3, Mo., as an authorized distributor for GE insulating materials produced by its Chemical Dept., Pittsfield, Mass., also has been announced.

C. H. Rieman has been appointed manager of the mining division of Gardner-Denver Co., Quincy, Ill., succeeding A. W. Dale, who died in December. Mr. Rieman has been associated with the company's mining division for 14 yr and since 1948 has been district manager at Duluth.

Wilbert E. Meyer, 52, head of the sales and engineering department of the Enterprise Wheel & Car Corp. of W. Va., Huntington, W. Va., died Jan. 19 at a Huntington hospital. Associated with the company for 30 yr, Mr. Meyer had lived in Huntington for 15 yr and had been active in several lodge and civic organizations in the city.

Duff-Norton Mfg. Co., Pittsburgh, has named **T. W. Krueger** assistant general sales manager. Mr. Krueger joined Duff-Norton in 1947 as advertising and sales promotion manager and will continue to direct the company's advertising and sales promotion activities.

Jeffrey Mfg. Co., Columbus, Ohio, has named **Russell W. Knode** manager of its export department. Mr. Knode, who formerly was assistant export manager, succeeds Robert A. Currie, who died last December. L. E. Bixby, an assistant in the contract department, has been advanced to manager of that division.

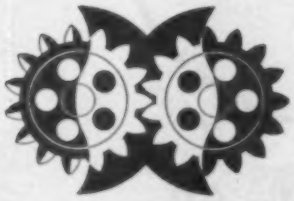
Harry N. Kepler has joined the mining division of the Cardox Corp., Chicago, as a sales engineer specializing in underground coal-recovery auger drills. Mr. Kepler, whose present headquarters is in Marion, Va., has been associated with Robins Conveyors, Inc., for the past 10 yr and previously was with the Macon County Coal Co.

B. F. Goodrich Co., Akron, has appointed **A. Clarke Mack Jr.** manager of flat belting with industrial products sales division, including conveyor, elevator and transmission, to succeed J. Robert Thompson, who has been appointed manager of the Atlanta district for the division. Mr. Thompson succeeds Art Coffin who has retired after some 35 yr of company service.

Athey Products Corp., Chicago, has appointed **Worthington J. Gross** manager, governmental division at Washington, D. C., and **Bert C. Landstrom**, district representative for the seven Eastern states and the Northeastern part of Canada. Prior to joining Athey, Mr. Gross was affiliated with Engineering & Research Corp., River-

THE *Truth* ABOUT

DOUBLE ROLL CRUSHERS



It's not the amount of fines you expect to get that counts . . . it's the amount of fines that are *actually* in the product from the Crusher.

Double Roll Crushers are ideal under certain conditions and, certainly, the wrong type under others.

- **Maximum feed size must be in proportion to the diameter of the rolls.**
- **Absolute uniform feed must be provided in proportion to the capacity of the Crusher.**

These two factors must remain constant . . . otherwise another type of machine may be better.

Jeffrey builds Double Roll, Single Roll and FLEX-TOOTH Crushers for reducing coal to all size products.

(1) Tell us what you want to do, (2) give us the details of your application . . . only then can you be sure that you will get the correct type of Crusher for your specific job.

THE JEFFREY MANUFACTURING COMPANY Established 1877

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Baltimore 2 · Beckley, W. Va. · Birmingham 3 · Boston 16 · Buffalo 2 · Chicago 1 · Cincinnati 2 · Cleveland 15 · Denver 2 · Detroit 13 · Harlan, Ky. · Houston 2 · Jacksonville 2 · Milwaukee 2 · New York 7 · Philadelphia 3 · Pittsburgh 22 · St. Louis 1 · Salt Lake City 1 · Scranton 3

Jeffrey Mfg. Co. Ltd., Montreal, Canada
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Complete Line of Material Handling, Processing and Mining Equipment

BAKER Blades

Bulldozer and Gradebuilder

Positive *hydraulic* action—that's the secret of the smooth performance that we build into every Baker Bulldozer and Gradebuilder. *Positive down-pressure* and *direct lift* are the twin features of this hydraulic action. Twin engine-mounted hydraulic cylinders (Baker was first, again, with engine-mounting) do the job in these new BAKER attachments for your new and more powerful ALLIS-CHALMERS Tractors. Write today for Bulletin 894.

...and if you want to pull 'em out by the roots ...BAKER ROOT RIPPER

P.S.: Baker is the PIONEER and the SPECIALIST in bulldozers

dale, Md., as assistant to the president in charge of government sales. Mr. Landstrom formerly was salesman, branch manager and sales manager, successively, of the Bockwith Machinery Co., Pittsburgh.

C. Russell Conklin, Eastern district manager for the Republic Rubber Div., Lee Rubber & Tire Corp., has been named manager of its Philadelphia office, succeeding Warren Ingersoll, now assistant to the president of the Lee corporation. Ray L. Beveridge has been appointed field engineer, with headquarters at Republic's Philadelphia district office.

Carl J. Meister, general sales manager since 1943, has been appointed vice president and director of sales, Atlas Chain & Mfg. Co., Philadelphia. In addition to his new post, Mr. Meister will serve as director of sales for the Atlas Metal Stamping Co., Philadelphia.

John Avery, since 1946 president of Roots-Connersville Blower Corp., Connersville, Ind., died Jan. 13 following a heart attack. Mr. Avery became a project engineer for Brown-Boveri Co. of Switzerland in 1926, and from 1932, until joining Roots-Connersville, he was connected with Allis-Chalmers. Mr. Avery was active in atomic development work during World War II, and received the Kellex Key for outstanding service. He was a member of the executive board of the Machinery & Allied Products Institute and a director of the Compressed Air & Gas Institute.

Caterpillar Tractor Co., Peoria, Ill., has created an additional sales division to meet expanding company needs and will now operate with four administrative sales divisions. The newly created Plains division is made up of territory formerly under the Central division, which will take over part of the Eastern division. Promotions announced as a part of the change include: Kenneth F. Ames, formerly head of sales training, newly appointed sales manager, Plains division; Lee Morgan, recently district representative in New York state, and Gordon Fowler, former eastern sales division assistant, named assistant sales managers; E. A. Tiarks, formerly district representative, advanced to assistant sales manager, Western division; and W. F. Jordan, also a former district representative, assistant sales manager, Eastern division. The engine sales department, managed by H. W. Smith, now will operate as the industrial division of general sales department under H. H. Howard, director of sales, with Mr. Smith continuing as manager of the division, it was announced.

Merging of the Cocoon engineering division of the R. M. Hollingshead Corp., Camden, N. J., with the company's industrial-aviation division has been announced. Sales of Whiz Co-

NOW

DEWATER FINE COAL AT LOWER COST

WITH

WEMCO COAL SPIRALS

Serving the same functions as settling type tanks of far greater mechanical complexity, WEMCO COAL SPIRALS are simpler, less expensive machines used in a variety of coal preparation applications.

DEWATERING AND DESLIMING

- *Pea, buckwheat, rice, and barley coal or refuse*
- *No. 4 and No. 5 buck coal or refuse*
- *Coal or refuse, 65 mesh to 1½ inch*
- *Table feed*
- *Heavy density fines*
- *Fine coal feed to froth flotation*

Simple operating principle

1. Feed (coal and water) enters the side of the tank; 2. water overflows carrying slimes, and 3. coal settles in the tank and is conveyed up the incline with a turning squeezing action to eject and drain free water.

Balanced capacity

WEMCO COAL SPIRALS provide a balanced settling operation, combining a large settling pool with a high capacity spiral raking mechanism.

Low operating costs

WEMCO's simply mounted spiral shaft contrasts sharply with the innumerable wearing points in the links, chains, pivots, drive sprockets, etc. in other machines. As a consequence, power and maintenance costs are greatly reduced.

A size for every need

A choice of various spiral diameters, pool sizes, and spiral designs are combined to provide correct machines for a wide range of conditions and requirements. **WEMCO COAL SPIRAL** capacities vary with size—dewatering up to 6,000 g.p.m. at 28 mesh (1,500 g.p.m. at 65 mesh)—conveying up to 240 t.p.h. (¼" x 0" coal, sp.gr. 1.8).

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  Dr. Ing. Herbert Lickfett, A/B, Stockholm 3, Sweden
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  Agence Miniere & Maritime, S. A., Antwerp, Belgium
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WESTERN MACHINERY COMPANY
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MOBIL-MILLS	FAGERGREN & STEFFENSEN FLOTATION MACHINES	DEWATERING SPIRALS
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FOR *Safest* INSTALLATION OF ROOF BOLTS

ALWAYS USE DEPENDABLE

DUFF-NORTON

Mine Roof

JACKS

Don't take chances! Be assured of maximum safety with Duff-Norton mine roof jacks as temporary supports, when installing split rods, expansion bolts and all other type suspension supports in your mine. For complete data on mine roof and other Duff-Norton Mine Jacks . . .

See your local distributor or write for the "Handy Guide for Selecting Duff-Norton Mine Jacks."

THE DUFF-NORTON MANUFACTURING CO.

MAIN PLANT and GENERAL OFFICES, PITTSBURGH 10 PA. · CANADIAN PLANT TORONTO 6, ONT.

"The House that Jacks Built"

econ will now come under the industrial-aviation division, which is headed by Fred H. Lee, sales manager, but no marketing or policy changes are contemplated at the present time.

Edward O. Boshell has been elected chairman of the board and president of the Westinghouse Air Brake Co. and its subsidiary, the Union Switch & Signal Co., Pittsburgh. A. N. Williams, who has served as president of both companies since 1946, has been elected vice chairman of the board and Herbert A. May has been elected senior vice president. Mr. Boshell has been chairman of the board and president of Standard Gas & Electric Co., New York, and of the Philadelphia Co., Pittsburgh, since 1948, and he will continue in a consultative and advisory capacity to the utility organization.

The U. S. Steel Corp. has announced several changes in personnel. David A. Challis Jr., formerly assistant to the general manager of sales, has been named assistant general manager of sales, United States Steel Co. John H. Elliott, formerly assistant general manager of operations, has been appointed general manager, manufacturing, and William C. Oberg, formerly general manager of operations for Carnegie-Illinois, has been named manufacturing consultant, U. S. Steel Co. Charles W. Baldwin has been named director and John W. Clinton assistant director of the coal chemical sales division, commercial department, U. S. Steel Co. Mr. Baldwin replaces John V. Freeman, who is retiring after 43 yr of service with U. S. Steel.

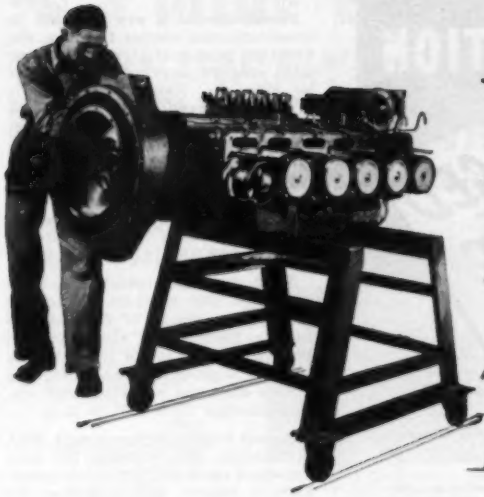
Charles Bangert Jr., formerly assistant manager, has been appointed manager of engineering for the Trumbull Electric Mfg. Co., Plainville, Conn., in charge of all engineering activities for the company.

W. W. Warner, for the last 23 yr chief engineer of the Davey Compressor Co., Kent, Ohio, has been elected vice president in charge of engineering.

H. N. How, president, Western Machinery Co., San Francisco, has accepted the invitation of Secretary of Interior Oscar Chapman to serve on the Advisory Committee on Mining Machinery in Washington, D. C.

The second major expansion in the last few months announced by Cummins Engine Co., Inc., Columbus, Ind., includes an immediate extension of 9,600 sq ft on the DD fuel pump building completed only 18 mo ago and new machinery for increasing the manufacturing capacity for the recently announced new Cummins DD fuel pump and component parts. An expenditure of about $400,000 is involved. The new facilities are expected to increase the size of the plant more than 30% and boost to more than $6,000,000 the amount Cum-

Cummins® Custom-built Diesels



Built not once but Twice

Best buy in power is the engine that's built best

Cummins Diesels have an outstanding record *and* reputation in a wide range of Diesel applications. And here's one reason!

Rugged, lightweight, high-speed Cummins Diesels perform better because they're built better, under strictest quality control methods. Moreover, each engine is actually built twice! After initial assembly, each engine is run in on the test block. Then it is torn down and carefully re-inspected — and after that it is re-assembled and tested *again*.

Such *extra* care in precision building . . . Cummins exclusive fuel system . . . reliable world-wide service and parts organization . . . enable Cummins users to get peak performance . . . less "down-time" and *more* rugged, dependable power.

Better contact your Cummins dealer. He has more facts to show you about making more profits.

Diesel power by CUMMINS

CUMMINS DIESEL

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, IND.

EXPORT: CUMMINS DIESEL EXPORT CORPORATION
Columbus, Indiana, U. S. A. • Cable: Cumdiex

Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks • off-highway trucks • buses • tractors • earth-movers • shovels • cranes • industrial locomotives • air compressors logging yarders and loaders • drilling rigs • centrifugal pumps generator sets and power units • work boats and pleasure craft.

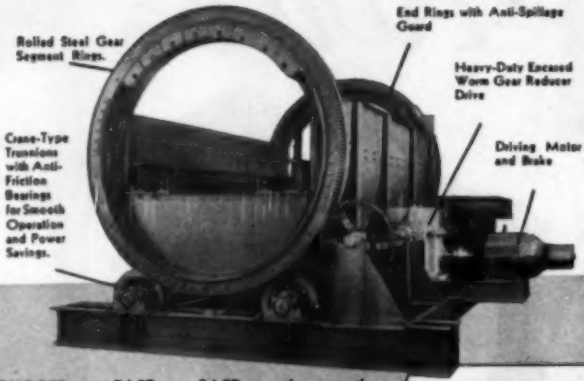
Here's the answer—

TO LOW-COST OPERATION

CONNELLSVILLE (LEPLEY) ROTARY MINE CAR DUMPS

RUGGED FAST SAFE

WITH THESE BUILT-IN FEATURES . . .


Rolled Steel Gear Segment Rings.
End Rings with Anti-Spillage Guard
Heavy-Duty Encased Worm Gear Reducer Drive
Crane-Type Trunnions with Anti-Friction Bearings for Smooth Operation and Power Savings.
Driving Motor and Brake

RUGGED . . . FAST . . . SAFE . . . these are the qualities built into CONNELLSVILLE (Lepley) Rotary Mine Car Dumps that have enabled them to give the most economical service over long periods of time. CONNELLSVILLE (Lepley) Dumps installed in 1927 and 1929 are still in operation and meeting the demands of modern mechanized coal handling.

CONNELLSVILLE (Lepley) Rotary Mine Car Dumps are designed with simplicity and certainty of operation prevailing, with the object of keeping maintenance and repair costs at a minimum. By either lever or pushbutton, one man controls the entire dumping operation . . . Cars are automatically power-locked in position and held secure while discharging . . . Coupled or uncoupled cars are dumped in a 10 second operation . . . Positive gear drive on each end prevents twisting of car in frame.

The proved quality of CONNELLSVILLE (Lepley) Rotary Mine Car Dumps is your assurance of long-term, low-cost operation.

EXCLUSIVE!

EXCLUSIVE with CONNELLSVILLE (Lepley) Rotary Mine Car Dumps are the machine - cut gear rings that mesh with the machine-cut pinions resulting in drive from both ends without play and slippage.

We also manufacture CAGES, HOISTS, HAULAGES, MINE FANS, SKIPS, COAL AND SLATE LARRIES, ROTARY ROCK DUMP CARS, LEPLEY HOISTING EQUIPMENT, YOUGH PUMPS, FORT PITT CAR-CAGING EQUIPMENT.

CONNELLSVILLE MANUFACTURING & MINE SUPPLY CO.
CONNELLSVILLE, PA.
SERVING THE MINING INDUSTRY SINCE 1901

mins has expended since the end of World War II for additional manufacturing facilities and for modernizing the Columbus plant. Production capacity in the 5-yr period also has been increased about 60%.

Completion of a new building to house expanded service facilities, the first step in an over-all plant-enlargement program announced by the Fuller Mfg. Co., Kalamazoo, Mich., is expected to greatly benefit equipment users by reducing downtime of Fuller-equipped vehicles to a minimum through speeding shipping of service parts to Fuller field service stations, the company reports. Construction of a second new building, to accommodate increased research facilities, already is under way.

W. R. Persons, general sales manager since 1946, has been elected vice president in charge of sales of The Lincoln Electric Co., Cleveland. Mr. Persons joined Lincoln in 1934 as a welding engineer in the Pittsburgh branch office and was Pittsburgh district manager from 1937 to 1945.

Arnold Payette, formerly with MSA in Timmins, Ont., Canada, has been appointed sales and service representative in Bolivia, Chile and Peru for Mine Safety Appliances Co.'s International Div., with headquarters in Lima, Peru. MSA's Bluefield, W. Va., district office now is located at 1513 Bluefield Ave., Charles V. Miller, district manager, recently announced.

Coal-Land Lessors Form New Association

Owners of lands leased or available for lease as coal-producing properties will henceforth be represented by the National Council of Coal Lessors, Inc., the organization of which was announced in Washington Feb. 5.

Initial officers of the new corporation, which has been chartered under the laws of the state of West Virginia, are: Rolla D. Campbell, Huntington, W. Va., president; James W. Haley, Arlington, Va., vice president; J. M. B. Lewis, Jr., Bluefield, W. Va., secretary; and Roger F. Cooper, Lexington, Ky., treasurer.

One of the first objectives of the new organization is to seek amendment of that portion of the Internal Revenue Code that allegedly discriminates against coal-land lessors. Under present law, income resulting from royalties paid to lessors is treated as ordinary income, and Mr. Campbell, president of the new lessors' council, offers this evidence as one of the reasons why the provision should be revised:

"Congress very properly recognized in 1943 that income realized from the sale of timber on a stumpage basis is a capital gain rather than ordinary income. Certainly the conventional lease arrangement whereby the land

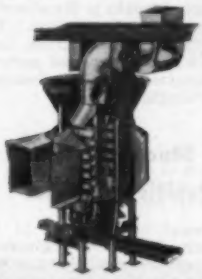
Holmes MINE EQUIPMENT NEWS

PUBLISHED BY ROBERT HOLMES and BROS., Inc. • A-5 JUNCTION AVE., DANVILLE, ILLINOIS

ENTIRELY NEW ADVANCED-DESIGN HOISTS

NEW ECONOMY WITH BAUGHMAN VERTI-VANE THERMAL COAL DRYER

Handles all sizes from 1½" down—reducing surface moisture to approximately 2% in a "One-pass" operation — delivering a uniformly dried and well-mixed product with practically no degradation. Each unit designed for capacities



ranging from 15 to 75 tons per hour. Multiple unit installations recommended for large-scale operations. Ask for Catalog No. 101.

LONGER LIFE FOR ROPES AND SHEAVES

Holmes' Bicycle and Cast Spoke Type Sheaves have lightweight yet strong section to avoid undue bearing wear. Low sheave inertia plus accurately machined grooves insures longer rope life. Available with plain groove or with renewable steel liners — both single and double grooved. Diameters from 14' down to the smallest. With or without shafts and bearings.

Operators Say Holmes' Hoists Meet All Individual Requirements

300 H. P. Two-Speed Electric Man and Material Hoist for Illinois coal mine with shaft 900' deep. Two-inch rope winds on 10' x 13' Bi-Cylindro-Conical drum at 750' per minute hoisting men, and 260' per minute hoisting heavy materials. Speed changes by finger-tip control of air clutches. Note compact control console.

Feature the Latest and Most Complete Control Equipment

Designed and engineered to meet the exacting requirements of various mine hoisting operations, Holmes' Hoists incorporate the most modern developments and finest materials and alloys to resist wear, avoid breakdown and maintain high production through years of continuous service. Robert Holmes & Bros., Inc., with over 50 years in mine equipment production, use this experience in the design and manufacture of the most advanced hoisting equipment in the field today. The records of Holmes' Hoists are outstanding and many are still serving the mining industry for a second generation.

COMPLETE CAR CONTROL WITH . . . HOLMES' RETARDER AND CAR PULLER

Regular Car Retarders available in Standard (130-ton load) and Heavy-Duty (300-ton load) Models.

Handles any length railroad car under the loading point. Totally enclosed and self-contained. Ruggedly constructed, yet small enough to set between tracks without being a hazard to ground crew. Multiple controls for operation by car trimmer and ground crew. Planetary gears and air braking system eliminate drag and permit surges of power for starting frozen cars. Over-belted V-belt drive protects motor.

MODERN OPERATORS PREFER HOLMES' ENGINEERED CAGES

For faster caging, hoisting and dumping, more and more mines are installing Holmes' Cages. A complete line of Stationary Platform, End and Side Dumping, Overturning, and Man and Material cages in aluminum or steel are engineered to meet your exact requirements. Modern design is incorporated with rugged, well-balanced construction of the highest quality materials and the latest safety devices.

ANNOUNCING NEW DUST-TIGHT COAL LABORATORY PULVERIZER!

Dustless operation. None of the sample is lost. High grinding rate with negligible over-size material. Even, constant feed maintained by easy-turning screw-feed. Grinds 20-mesh material down to small micron sizes. Rugged and compact construction with quick opening feature for easy cleaning.

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Please send me further information on—

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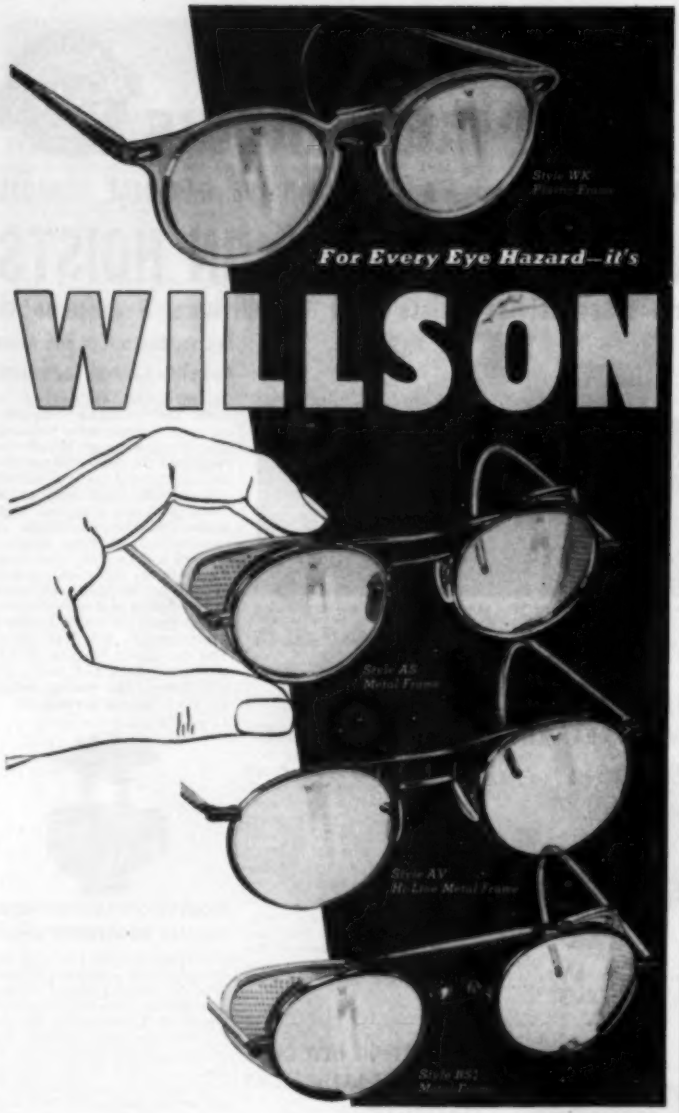

WILLSON*
Dependable Products Since 1870
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Protection • Comfort • Appearance

. . . only the most complete line of safety spectacles with Super-Tough* lenses gives you *all three* in metal or plastic frames. You'll find WILLSON safety spectacles an ideal combination of strength, comfort and good looks. And you need *all three* to get full cooperation from workers who must wear eye protection. See our new catalog for complete information. Get it from our nearest distributor, or write direct to WILLSON PRODUCTS, INC., 239 Washington St., Reading, Pennsylvania.

owner makes his coal available for production is an even stronger case for capital gains treatment. As a matter of fact, a coal land owner sells his coal to the person who mines it. Moreover, the timber can be regrown in a matter of years, whereas the coal once mined is gone forever."

Charging that an "obvious tax inequity" works against the coal-land owner, Mr. Campbell explained that income realized from sale of coal lands outright is recognized as a capital gain, whereas when the coal is sold to a producer on a per-ton basis, the income is treated as ordinary income.

"If the land owner has timber on the surface and coal underneath the surface," Mr. Campbell continued, "he is permitted to treat his income from timber sold on a stumpage basis (that is, by the board feet cut) as a capital gain, but must consider income from the sale of his irreplaceable coal—sold by the ton mined—as ordinary income."

The council president said that Congress "will correct this inequity if it is properly brought to the attention of senators and representatives." The new association, which invites communications from interested persons, has headquarters at 316 Southern Bldg., Washington 5, D. C.

Mining Students Hear Opportunities In Coal

Employment opportunities in the coal industry for mining engineering graduates still are available and varied according to five representatives of the industry who met with Penn State mining students at a meeting of the student chapter, AIME, at State College, Pa., Jan. 10.

In the panel of industry representatives were: H. A. Dierks, vice president and general manager, Glen Alden Coal Co., Wilkes-Barre, Pa.; J. N. Geyer, production engineer, Imperial Coal Corp., Johnstown, Pa.; H. E. Sanford, chief, Johnstown branch, health and accident - prevention division, USBM; M. D. Cooper, director of mining engineering education, NCA, Pittsburgh, Pa., and H. D. McGinnis, technical representative, du Pont Co., Pittsburgh.

Panel consensus was that young engineers have many opportunities in coal, but advancement may not always proceed at an expected rate. The graduate must expect to give some of his time to training and gaining experience before he can accept the responsibility of an operating or engineering position.

Panel members stressed the importance of summer employment at mining properties for the double purpose of giving the student a chance to orient himself in the industry, and giving the employer an opportunity to rate the student on his future prospects with the employing company.

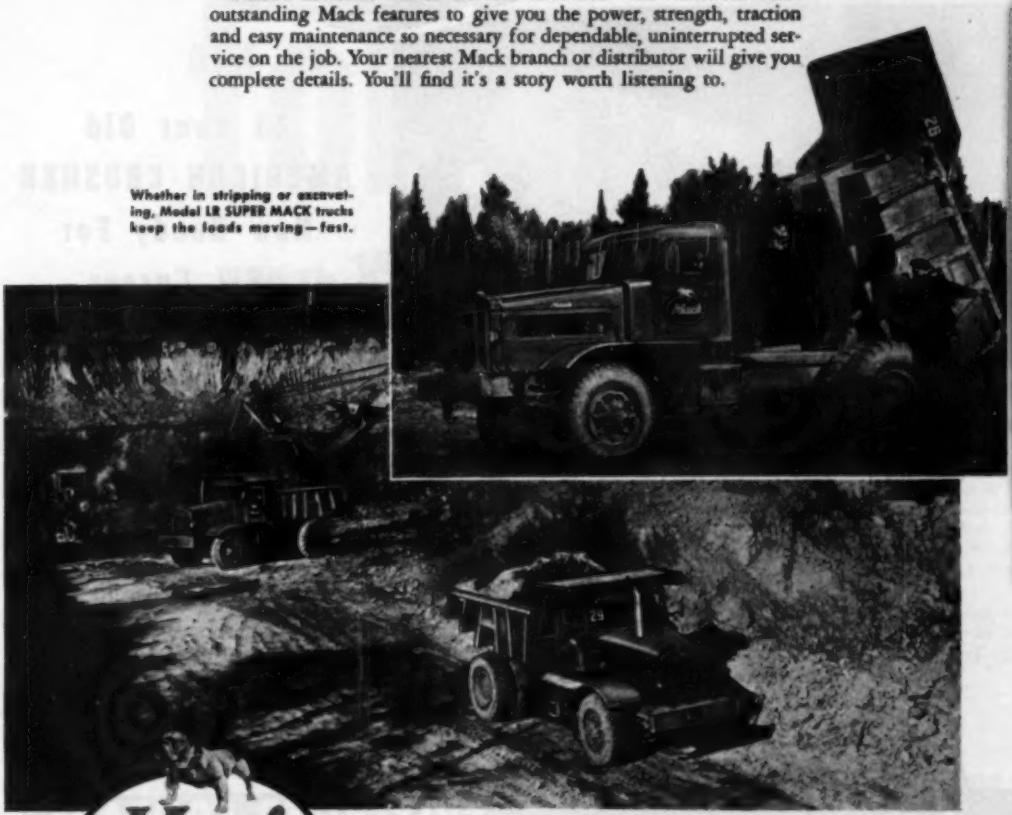
Macks ARE Masters

OF THE TOUGHEST TERRAIN

No matter how tough the going... under the worst of weather conditions... through slippery mire or shifting sand... or over rutted, uneven ground — big SUPER MACK trucks keep the payloads moving on time... at less cost and with less absenteeism.

One big reason why Mack trucks lick the toughest terrain is the exclusive Mack Power Divider. Where unequal tractive requirements are encountered, the Power Divider differential distributes torque to favor the driving wheel having the most traction, thus eliminating power dissipation in useless wheel slippage.

Mack's exclusive Power Divider combines with numerous other outstanding Mack features to give you the power, strength, traction and easy maintenance so necessary for dependable, uninterrupted service on the job. Your nearest Mack branch or distributor will give you complete details. You'll find it's a story worth listening to.



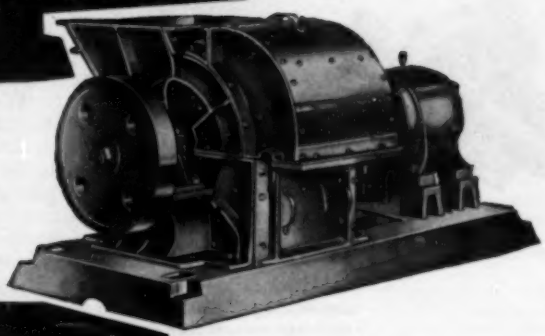
Whether in stripping or excavating, Model LR SUPER MACK trucks keep the loads moving—fast.

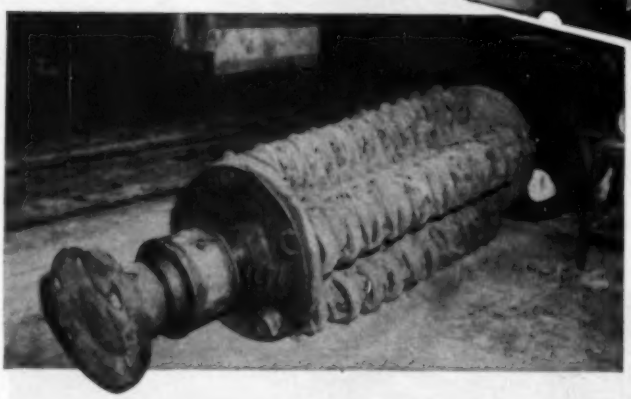
Mack TRUCKS ... *outlast them all*

Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

2,574,000 TONS CRUSHED COAL

(WITHOUT OVERHAULING)





23 Year Old AMERICAN CRUSHER Now Ready For NEW Career

Far from being ready for retirement, the 23-year-old American Crusher, whose rotor is shown here, was recently overhauled and transferred to its new home at the Arkwright Mine in Morgantown, West Virginia—where it is now prepared to start a new and productive life.

Since 1927 this mechanical "old faithful" has reduced over 2½ million tons of 6-inch lump to minus ¾ inch screening—at a ***total parts-replacement cost of only $.0007 per ton*** (including the recent reinstallation costs).

Only such features as the exclusive, patented Shredder Ring—originated and perfected by American—could produce such long-lived, economical performance as shown in this typical case history. When you plan to purchase a coal crusher, plan to investigate the built-to-produce American Rolling Ring Crusher.

PATENTED MANGANESE STEEL SHREDDER RINGS

WRITE for Bulletin "CRUSHING COAL AT LESS THAN 1¢ PER TON"

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 MACKLIND AVE.
ST. LOUIS 10, MO.

triple play for profit

with P&H ELECTRIC SHOVELS

All three of these P&H Electric Shovels are at work for J. Robert Bozely at Pottsville, Pa. There are three sizes at work here — 4, 5 and 6 cu. yds., all delivering steadily at rock bottom costs.

P&H leads the field in Electric Shovel Developments.

It's the same pattern wherever these new P&H Electric Shovels go to work: The first machine sells the second — the third — and more.

The reasons are plain and simple — *better performance — bigger production — lower tonnage cost.*

Reasons behind the reasons are such advantages as P&H Magnetorque* which powers hoisting motions electro-magnetically — smoother, faster, more dependably . . . rugged all-welded construction with more strength to withstand shock loads . . . independent propel for quicker move-ups . . . stepless control which eliminates all contactor troubles . . . filtered air cab ventilation for less electrical down time.

The cold, hard facts that count are: *performance, production, low tonnage cost.* Figure your costs with P&H Electric Shovels and you'll find a convincing difference. It explains why every third P&H Electric Shovel sold is a repeat order.

*T. M. of Harnischfeger Corporation for electro-magnetic type clutch.

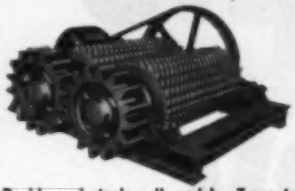
P&H ELECTRIC SHOVELS
4540 West National Avenue
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION

Every third P&H Electric Shovel sold is a repeat order

EXCAVATORS • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • CRAWLER AND TRUCK CRANES • DIESEL ENGINES • PRE-ASSEMBLED HOMES

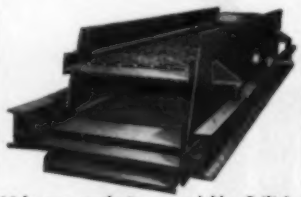
MODERNIZE WITH BONDED EQUIPMENT

COAL CRUSHERS



Double and single roll models. Types to produce ¾" stoker, and others to crush up to 8" resultant. Capacities from 15 to 500 tons per hour. Steel hoppers included. Priced from $435.00.

VIBRATING SCREENS



Make your products more salable. Built in 1 to 5 decks. Screen sizes 2' x 4' to 5' x 14'. Priced from $435.00.

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Troughing idler conveyors and picking tables. Lengths from 10' to 500'. Widths to 60". We also build flight conveyors. Any length; flights up to 8" x 24".

IDLERS

Troughing, picking table and return idlers. Ball bearing; all steel. Single and three-roll. Priced from $9.00.

Build your own conveyor; we have in stock standard sections, head and tail pulleys, screw takeups, gravity takeups, troughing and picking idlers, return rollers, belting, drives, speed reducers, sheaves, etc. Phone us your order.

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New Mine Developments

Acquisition of a controlling interest in The Consolidated Coal Co., St. Louis, Mo., by a New York firm which contracted to deliver the Consolidated Coal assets to the Zeigler Coal & Coke Co., Chicago, at a later date was reported Jan. 30. Mines acquired from the Consolidated Coal Co. will be operated by the Bell & Zoller Coal & Mining Co. and the coal produced sold by the Bell & Zoller Coal Co., A. M. Rogers, president of the Zeigler Coal & Coke Co., announced.

Later on Feb. 6, Lehman Bros., prominent investment banking firm, revealed that it was the New York organization handling the transaction. It had already acquired a majority interest in Consolidated after making an offer to all stockholders and expected to hold more than 95% of the stock when pending transactions were completed.

West Kentucky Coal Co., Madisonville, Ky., announced last month that it had begun construction work on its new Atkinson mine. The operation will be a slope mine, with a daily capacity of 4,000 tons and a life expectancy of 10 yr, and will be fully mechanized. It will mine the No. 9 seam and ship via the L. & N. and Illinois Central railroads. The mine is named in memory of John B. Atkinson, president of the St. Bernard Mining Co., who died in 1911. West Kentucky Coal Co. took over and merged with the St. Bernard organization some 20 yr ago. The property is being opened, it is reported, to meet increasing demand in the Paducah, Ky., area, where the TVA is installing a new power plant and the Electric Energies Co. is planning a newly announced power plant at Joppa, Ill., to serve a new atomic-energy installation.

Consolidation Coal Co. (Ky.), a Div. of Pittsburgh Consolidation Coal Co., Jenkins, Ky., has acquired property in Ashland, Ky., for the future operation of a river tipple and coal-storage yard. Located between the Ohio River and the main line of the C. & O., the site has been used as an airport for small planes until recently. While definite plans for construction have not as yet been made, Consol eventually will erect facilities for unloading, storage and re-loading of coal for shipment by either rail or river. River shipments will necessitate the erection of a tipple with suitable docks.

To secure 100 tons of coal for analysis purposes, the Clinchfield Coal Corp., Dante, Va., last month was reported to have temporarily re-opened a shaft mine in Russell County, Virginia, which had been closed for 27 yr. According to reports, 40 tons of the Tiller seam coal removed was shipped to the Stamford, Conn., laboratory of the American Cyanamid Co., which is said to be considering construction of a chemical plant at Carbo. American Cyanamid was reported to have held options last year on several thousand acres of coal land in Russell and Dickinson Counties, most of which was owned by Clinchfield Coal. Additional samples were sent to Chicago and St. Louis for coking and other tests.

The new Burning Star No. 2 mine of the Truax-Traer Coal Co., near DuQuoin, Ill., reportedly began production Feb. 20. The property will eventually have an output of 5,000 tpd, with a life expectancy of 25 yr planned. Another shift will be added to the preparation plant of Burning Star No. 1 near Elkville to process coal from the new operation, it was reported.

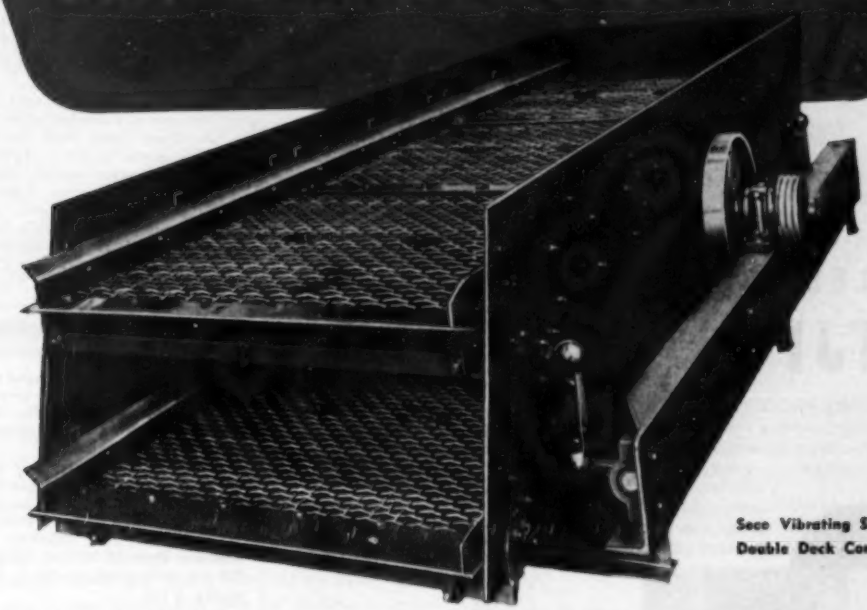
The Hallidayboro mine of the Hallidayboro Coal Co., Elkville, Ill., has been acquired by the Lafayette Coal Co., and will be known as the Joliana mine of the Joliana Mining Co. At a recent meeting of the board of directors of the Lafayette Coal Co., the following officers were elected: W. E. Brandt, chairman of the board; W. A. Brandt, president; Robert E. Brandt, vice president; M. McEntree, secretary-treasurer; and H. S. Pratt, sales manager.

Opening of a new drift operation near Anawalt was announced last month by the W. Va. Mining & Consulting Co., which also reported that it was about to move its headquarters from Charleston to Bluefield, W. Va. The company has been carrying on a 1,500-tpd stripping operation in the No. 3 Pocahontas seam on properties of the U. S. Steel Co. since last fall.

If You Would Like a Copy of COAL AGE'S 1950 Index . . .

THE ANNUAL INDEX TO COAL AGE, Vol. 55, January to December, 1950, is available to all subscribers on request. A three-way analysis of 1950 issues, the index classifies all editorial articles by subject, by mine and company and by author. Subscribers who have occasion to refer to past issues will find it a very helpful addition to their file of COAL AGE copies. To request a copy, indicate that you would like the 1950 Index on the postage-free card opposite p 124 if you use this card to secure new equipment data; or, address a penny postcard to The Editor, COAL AGE, 330 W. 42nd St., New York 18.

This Means Business



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Yes, this ruggedly built Seco Vibrating Screen is a business-getter in no uncertain terms for coal producers who know that top price per ton buyers demand clean, properly sized coal.

You see these big rugged Seco Vibrating Screens take ton after ton of coal and screen it to the desired size and you realize how much of an advance this method is over any other method of sizing.

You talk to coal operators who have one or more Secos on the job doing everything from scalping to final sizing. They tell you the smooth, trouble-free operation of a Seco means top production of clean, properly sized coal hour after hour, year after year. Seco's patented construction produces controlled true circular action.

And then you begin to wonder . . . how much is it costing you not to have this modern equipment helping you prepare your product for market. We would welcome the opportunity to give you the facts!

Check Your Coal Preparation Costs Now! A SECO field man will bring you helpful modernization information, or write for Coal Bulletin #11, Dept. C.

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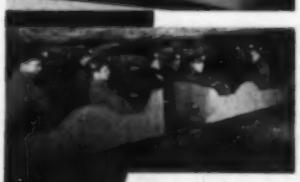
MORE PRODUCTIVE HOURS in your mine! The TJI Mine Jeep provides safer, faster transportation for your mine superintendent, foremen, engineers, inspectors and maintenance personnel . . . transportation to and from working faces — no waiting on trips—and when needed in emergency cases. A definite "time-saver", the Mine Jeep is a much-needed vehicle in your underground transportation system.

Fire fighting equipment — one of many units readily pulled by the TJI Mine Jeep.

The TJI Mine Jeep can easily be converted for ambulance duty at a moment's notice.



The TJI Mine Jeep pulls man trip cars, thereby cutting travel time and providing each section crew with independent transportation.

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Lee-Norse Company
CHARLEROI, PA

and with the opening of the fully mechanized underground mine, is expected to boost its daily capacity to about 2,000 tons. The tipple at Anawalt, formerly owned by the U. S. Steel Co., has been renovated by the company and is to be used for the present. C. B. Boone is president of the W. Va. Mining & Consulting Co. and Dale Henderson is superintendent of the Anawalt operation.

The Blue Hill mine, Marion, Ill., recently taken over by the Freeman Mining Co., was re-opened at the end of January. The mine, which formerly employed 130 men, had been idle since being flooded during a work stoppage early in 1950.

A new mine with an output of 1,200 to 1,500 tpd is expected to be opened by the Snap Creek Coal Co., Logan, W. Va., about April 1. Located at Tomlinson, Logan County, the property consists of some 1,900 acres available for development, with a seam averaging 44 in thick. A trackless mining system will be used and preparation facilities include a Chance cone.

Preparation Facilities

Stevens Coal Co., Westwood colliery, Trevorton, Pa.—Contract closed with Wilmot Engineering Co. for one 8-ft-diameter Hydrotator to prepare barley; feed capacity, 80 tph.

West Virginia Institute of Technology, Montgomery, W. Va.—Contract closed with Wilmot Engineering Co. for one 20-in-diameter Hydrotator for ¾x⅛-in coal, feed capacity, 7 tph; and one Type M Wilmot Simplex jig for pea or buckwheat No. 1, feed capacity, 5 tph.

Carbonifera Unida de Palau, S.A., Palau, Coah., Mexico—Shipment by Deister Concentrator Co. of 12 Super-Duty Diagonal-Deck coal-washing tables and 2 Concenco revolving feed distributors.

Lehigh Navigation Coal Co., Inc., Coaldale washery, Coaldale, Pa.—Shipment by Deister Concentrator Co. of 3 SuperDuty Diagonal-Deck coal-washing tables and 1 Concenco revolving feed distributor.

Evan Jones Coal Co., Anchorage, Alaska—Shipment by Deister Concentrator Co. of 2 SuperDuty Diagonal-Deck No. 7 coal-washing tables.

Youghiogheny & Ohio Coal Co., Van mine, Marnie, W. Va.—Shipment by Deister Concentrator Co. of 7 Super-Duty Diagonal-Deck coal-washing tables.

Alabama By-Products Corp., Prace, Ala.—Contract closed with Western Machinery Co. for one No. 3C Wemco Mobil-Mill, with the heavy-media separatory vessel consisting of a 6x5-ft Wemco drum separator; to initially treat 40 to 50 tph of 2½x¼-in jig middlings, and at a later date to be used for increased-tonnage treatment of unwashed coal.

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Wilmot CHROME-MANGANESE Chain

Made of an alloy steel containing 12-15% manganese and 2% chrome, Chrome-Manganese chain is specifically designed for use where abrasion is especially severe.

Tests show that, under abrasive conditions, Wilmot Chrome-Manganese chain outlasts 2 to 3 standard chains of carbon steel. Work-hardening increases its Brinell from 220 to 450.

Standard Wilmot cast Chrome-Manganese steel chain, as listed below, is furnished with pins of heat-treated drop-forged steel. Pins may be obtained in cast Chrome-Manganese; also the important wearing parts, sprockets, sprocket teeth, and traction wheels.

MADE FROM CHROME-MANGANESE STEEL

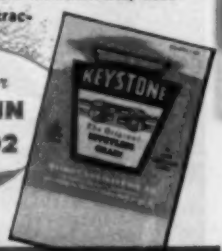
Size	App. Pitch	Average Ultimate Strength	Weight Per Ft.
458	4"	48,000	3.5
468	4"	80,000	8.25
678	6"	85,000	6.75
698	6"	140,000	13.0
998	9"	140,000	10.5
9118	9"	230,000	17.0
9148	9"	325,000	28.0

Everything for Your Conveyor

As the originators of Rivetless drop-forged steel chain, Wilmot

Wilmot Makes Largest Choice of Drop-Forged Chain & Attachments

stocks it in the largest choice of sizes available: 3" to 10½" pitches; average ultimate strengths to 460,000 lbs. Largest choice of chain attachments; cast iron or steel flights, sprockets, traction wheels, take-ups, shafting, bearings, casings, trough; for coal, sludge or ash conveyors.



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Vibrating Screen bypasses fines: Picking Table provides smooth, even, controllable flow, making this coal picking operation extremely efficient.
First Screen bypasses fines to bin No. 1. Picking Table permits efficient picking, moves coal to second Screen that sizes product for bins No. 1 & 2.
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Syntron Vibrating Screens and Grizzlies, Vibrating Picking Tables, Vibratory Feeders and Electric Vibrators have no motor, gears, eccentrics and other wearing parts that require maintenance and replacement.
Are compact . . . and dual-purpose in design, providing a feeding operation simultaneously with screening, scalping, picking, etc.
Finger-tip control of rate of flow is standard on all models.
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Societa Mineraria Carbonifera Sarda, Italy—Contract closed with Roberts & Schaefer Co. (through its foreign representatives, International Mfg. & Equipment Co., Inc., New York) for complete coal-washing plant, including screening plant, Baum-jig washing plant, retreatment of fines, Hydrotator classifier and centrifugal driers; capacity, 500 tph, ROM, producing clean coal, middlings and refuse; project includes ROM coal storage; stacking belt conveyor; reclaimed-coal belt conveyor to washer; clean-coal, middlings and refuse bins; complete building, plate work and piping; foundation and erection by coal company under supervision of R&S engineers; project is the first complete plant financed by the ECA.

Anthracite Conference to Review Industry Trends

The role the anthracite industry can play during the national emergency will be the theme of the 9th Annual Anthracite Conference to be held May 4 at Lehigh University, Frank W. Earnest, Jr., president of the Anthracite Institute, recently announced.

Prof. A. Copeland Callen, head of the department of mining engineering at Lehigh, has been named general chairman of the conference committee. Raymond C. Johnson, vice president of the Anthracite Institute, will serve as vice chairman.

Sponsored by the Anthracite Institute and Lehigh University, the meeting is designed to bring engineers, educators, operators and retail dealers, as well as the general public, up to date on the industry's technological progress.

New developments and trends in the mining, preparation, marketing and utilization of anthracite will be among the subjects discussed during the presentation of 10 papers by leaders in the industry, Prof. Callen said.

Honorary chairmen for the conference will be Dr. Martin D. Whitaker, president of Lehigh University; Mr. Earnest; C. Millard Dodson, president, Weston Dodson Co.; and J. B. Warriner, senior director, Lehigh Navigation Coal Co.

Serving on the planning committee with Prof. Callen are:

Joseph H. Kerrick, research engineer, Philadelphia & Reading Coal & Iron Co.; Allen I. Johnson, fuels and combustion consultant, Lansdowne; Lillian Cohen, advertising manager, Lehigh Navigation Coal Co.; Viola Schlacks, advertising manager, Philadelphia & Reading Coal & Iron Co.; G. H. Israel, service manager, Lehigh Navigation Co.

John M. Crosby, assistant to the president, Anthracite Institute; Paul A. Mulcey, director, Anthracite Institute Laboratory; C. M. McHeffey, sales representative, and John F. Mears, manager of dealer service, Hudson Coal Co.; J. D. Jillson, secretary, Anthracite Institute; Wilmon Kaiser, me-

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Conveyor & Elevator Belting • Transmission Belting
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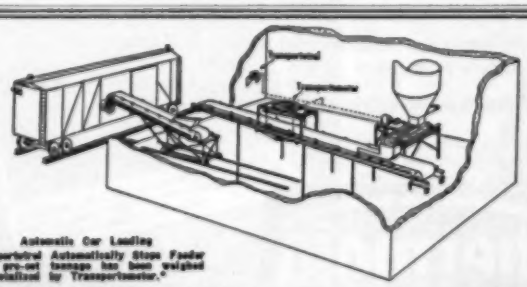

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*Reg. U. S. Pat. Office

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chanical and electrical engineer, Pennsylvania Coal Co.

Prof. Loyal V. Bewley, head of the department of electrical engineering; Dr. Robert T. Gallagher, professor of mining engineering, and Charles J. Moravec, university news editor, Lehigh University; C. G. Schantz, fuel engineer, Weston Dodson Co.; J. R. Ray, Fritch Coal Co.

Edward H. Walker, public relations director, Anthracite Institute; L. N. Burnside, manager, equipment division, Delaware, Lackawanna & Western Coal Co.; C. A. Garner, vice president, Jeddo-Highland Coal Co.; Alfred C. Glance, Allentown; C. A. Gibbons, vice president, Susquehanna Collieries Div., M. A. Hanna Co.; and William H. Lesser, Scranton.

EG&FA Contest Offers Paid Convention Trips

Knowledge of mine safety will pay off with a 3-day, all-expense vacation trip to Lexington, Ky., next June when Eastern Gas & Fuel Associates mine supervisors will be guests of the company, according to Joshua Smith, director of safety for the organization.

Those to make the trip will be selected on the basis of their standing in a written safety examination to be published in seven sections in the Safety News Letter of the EG&FA accident prevention department.

One supervisor from each of five groups of EG&FA mines, who makes the highest grade in the examination, will make the trip which will include attendance at the annual convention of the Mine Inspectors' Institute of America, June 4-6. The five groups of mines include those in Raleigh county, in Fayette county, in McDowell county, in Boone and Wyoming counties, West Virginia, and Weeksbury, Ky., and the Pennsylvania mines.

In addition to their expenses, the winners will have their wages paid by EG&FA while they are away from their duties. A year's membership dues in the institute also will be paid by EG&FA. Winners will have their choice of transportation, either by their own autos or by train or plane.

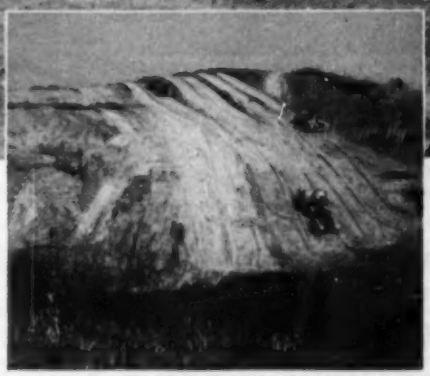
In a 1951 safety appeal to the 10,000 employees of the Coal Division, L. C. Campbell, vice president, last month asked for an even better safety record this year than last, reminding workers that "a mine accident is likely to be the fault of the man who gets hurt rather than someone else." His request was contained in personal letter addressed to each of the 1,000 supervisory personnel of the division.

48 NEW PRODUCTS . . .

OR CATALOGS are described in this issue. The handy postcard facing p 124 will bring you info on them—without obligation.

No Slip-up on Greasy Ridge

MORE POWER ON THE JOB—TD-24's deliver 148 maximum drawbar horsepower—more than any other crawler—work 340 days a year for Greasy Ridge Coal Company.



WORKING IN BOTH DIRECTIONS, TD-24's and scrapers make a 2000-foot figure eight every six minutes.

Strip mine operator scrapes off overburden in both directions—a 2000-foot round trip every six minutes—with the TD-24

Under 25 feet of overburden 175 feet wide, at Greasy Ridge, Ohio, there's a coal seam—Pennsylvania No. 8 bituminous—unprofitable to mine until they put the "Champ"—the TD-24—on the job.

Now six International TD-24's are turning in a record of performance and economy, uncovering 30,000 tons of coal in six weeks' time.

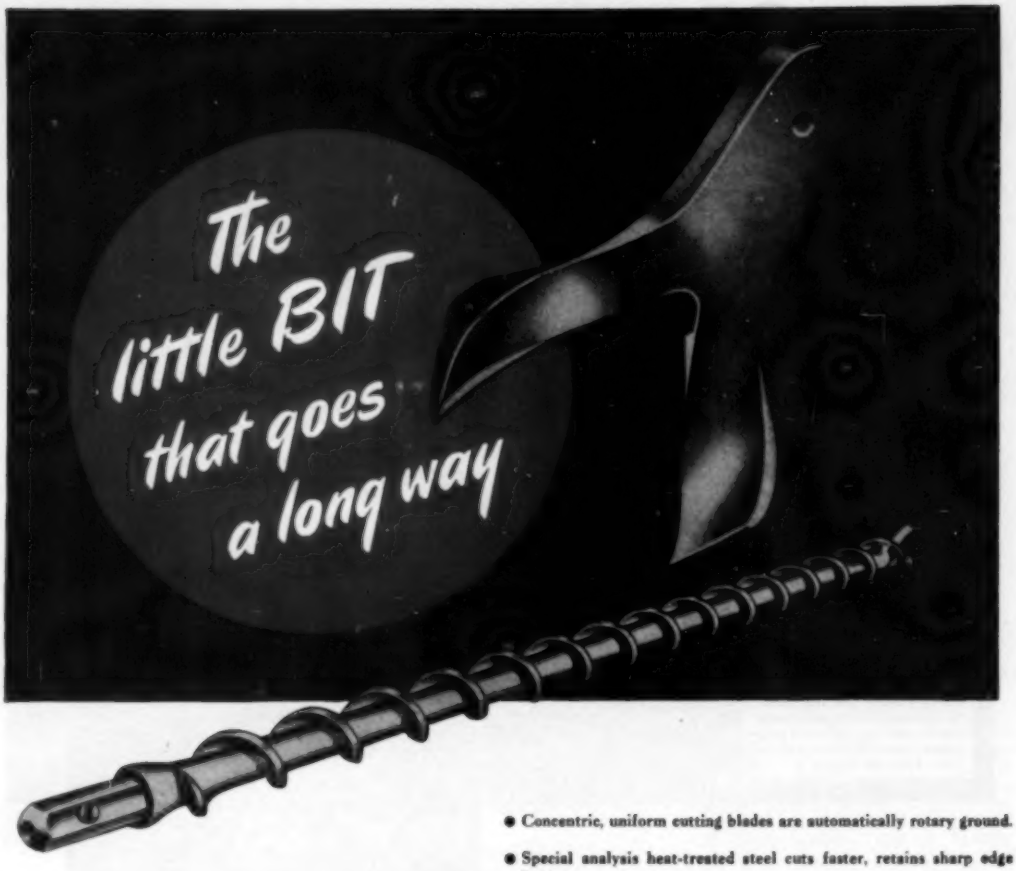
Pulling 19-yard heaped capacity scrapers, the TD-24's faster time-cycle really pays off—works in both directions without lost time—each tractor digs and moves two heaped loads every six minutes, traveling in a 2000-foot figure eight round trip, dumping at each end.

Power, agility, easy steering, fast footwork—that's why the TD-24 pays off. See your International Industrial Distributor and get this kind of power working for you.

International Harvester Company, Chicago 1, Illinois

INTERNATIONAL

POWER THAT PAYS



Coalmaster "1046" Drill Bit for 1⅞" Holes . . . Teamed with Spir-L-Weld Auger . . . Gives Longer, Faster, Cleaner Service

- Concentric, uniform cutting blades are automatically rotary ground.
- Special analysis heat-treated steel cuts faster, retains sharp edge longer.
- Advanced two-prong spiral design reduces power consumption.
- One-piece solid shank assures longer life.
- Quick-change bit fits into detachable or weld-on type drill head of Series 0875 "Matched Set" auger.

SPIR-L-WELD AUGER FEATURES

- High Tensile Alloy Steel Tubing
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- Uniform Pitch
- Spir-L-Welded to Core
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Mines Bureau Sets Up Two New Safety Sections

Intensifying the U. S. Bureau of Mines' program of accident prevention and promotion of health and safety in the Nation's mines and allied industries, Secretary of the Interior Oscar L. Chapman announced Jan. 27 the creation of two new sections in the Bureau's Health and Safety Division.

Donald S. Kingery has been named chief of the new Mine Haulage Safety Section, and Harold J. Sloman has been appointed head of the new Safety Educational Office, both with headquarters in Washington.

About 25 to 30% of mine accidents occur in haulage operations, Bureau Director James Boyd said, noting that this is second only to falls of roof and ribs as a cause of mine accidents. A Roof Control Section was established more than a year ago, he added. As chief of the Safety Educational Office, Mr. Sloman has already undertaken the task of coordinating the Bureau's extensive and long standing educational and training program.

Mr. Sloman was graduated as a mining engineer from Lehigh University and has been with the Bureau 8 yr. In addition to extensive engineering and operating experience, he has filled posts as a professor of mining engineering at the Pennsylvania State College, Carnegie Institute of Technology, and University of Alabama.

Mr. Kingery graduated as a mining engineer from Ohio State University in 1933 and first joined the Bureau in 1941. He served about 3 yr in the army during World War II as an engineering officer and later with the Allied European Government, during which he was in charge of mining operations in Italy, Sicily and Sardinia. He rejoined the Bureau in 1947, concentrating on mine-safety educational work.

NEWS BRIEFS . . . Begin on p 130

Schuylkill Cleaning Costs Up

The Pennsylvania General State Authority recently increased by $1,500,000 its allocation for cleaning up the Schuylkill River, providing for channel rectification from Reading to Norristown, and for final dredging operations in the Felix Pool. Some $250,000 of the increased allocation will be used to remove coal silt washed down at various points as a result of November and December floods. Other funds will be available for land purchases and a desilting basin at Darby Creek at Philadelphia.

Railroads Order Coal Cars

Purchase of a total of 4,500 coal cars was announced by three railroads late in January. The L. & N. reported

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FEATURES

- Lowered treatment cost due to highly efficient recovery
- Continuous, automatic recovery during fluctuating feed conditions
- No possibility of short circuits as air cooled magnet is suspended completely above water bath
- Test results indicate improved overflow weir action results in less media loss in overflow discharge
- Action of separator is visible to operator at all times
- Simplified operation
- Shipped complete, ready to install. No additional feeders or extensive piping necessary

AFTER completely satisfactory performance at the American Zinc Company plant at Mascot, Tenn., The American Cyanamid Company, as technical representative of the American Zinc, Lead & Smelting Company, has approved the STEARNS Type "MWI" Magnetic Separator for use in Heavy-Media plants. In operation in the Heavy-Media process in the concentrating of zinc ore, the STEARNS Type "MWI" Separator recovered better than 99.9% of the magnetic ferrosilicon.

The STEARNS Type "MWI" Magnetic Separator is equally adaptable for the recovery of media in Heavy-Media plants for the processing of all types of ores. This includes iron ores, fluorspar, rock products, coal, and similar materials. Specialized STEARNS Magnetic Separators are available for the recovery of other media such as magnetite.

Whether your problem is that of purification, reclamation, or concentration, STEARNS has a separator for you. From the fairly simple job of tramp iron removal to the concentration and beneficiation of complex ores, STEARNS has EXPERIENCE ENGINEERED equipment to meet your specifications.

Complete laboratory research facilities are available for thorough investigation of your separation problem. This includes a complete analysis of the practicability of applying magnetic separation, the testing of sample material, and the recommendation of specific magnetic separation equipment.

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For heavy-duty vibrating screens

Accuracy of sizing, freedom from clogging, and high production is assured when Hendrick Perforated Metal Plate is used on vibrating and shaking screens. Uniformity of mesh is maintained throughout unusually long service life.

Hendrick Perforated Plate can be furnished, either flat or corrugated, with any required shape and size of perforations, in tank, high carbon, high tensile, and abrasion resisting steels, stainless steel, and in other commercially rolled metals.

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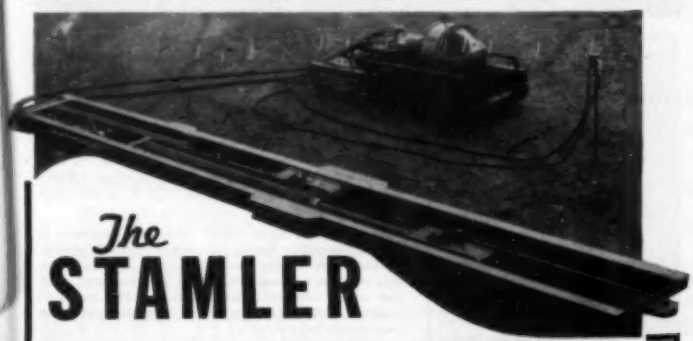

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1. CONTINUOUS MOVEMENT of cars fully controlled, but without costly delays.
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5. ELECTRICAL EQUIPMENT interchangeable with other mining machinery.
6. POWER UNIT LOCATED always out of the way.

THE W. R. STAMLER CO.
33 Fifteenth Street **Paris, Kentucky**

that of the 5,950 freight cars just ordered, 3,000 would be standard coal hoppers. The 5,950 cars are in addition to the 1,000 delivered in 1950 and another 1,000 previously ordered for delivery in 1951. The Chicago & Eastern Illinois R. R. announced that it had ordered 1,000 hopper cars and the Erie R. R. reported the purchase of 500 gondolas.

Pennsylvania Smoke Curbs Seen

A group of bills designed to provide Pennsylvania with an effective smoke-control system on a county-wide basis was to be introduced into the state legislature shortly, according to a recent announcement by Rep. Baker Royal, chairman of the Joint State Government Commission, a research arm of the General Assembly. The proposed legislation would provide for county-wide smoke-abatement units set up jointly by the participating communities. A three-man board would direct each county program and the state would share in the cost of technical assistants appointed to help the boards in handling smoke problems.

Coal Dealers in New CHS Plan

Coal Heating Service Div. of NCA last month reported the signing of the first contracts negotiated directly with individual bituminous dealers for their participation in the CHS cooperative market-improvement program. Under a new plan, designed to meet the needs of dealers in small communities and broaden the scope of the industry's program, retailers organize informally, working with the assistance of a steering committee selected from their membership, but do not form non-profit organizations as under the original plan. The first contracts covered 39 retailers operating in six groups.

Oil Output at New High

For the first time, domestic crude oil production in January exceeded 6 million bbl. a day. Output in the week ending Jan. 27 was at a new high of 6,065,700 bbl. a day, compared with the previous peak of 6,051,350 bbl. daily in the week preceding. According to reports, increased civilian demand was mainly responsible for the upswing, with the military currently using only 4% of the petroleum products consumed in this country. An increase of about 7% in oil demand is expected in 1951, but present domestic crude output could be stepped up by 750,000 to 1,000,000 bbl. a day without difficulty, industry officials report. Rationing would be necessary only if the present emergency grows larger, some oil leaders have said.

Maryland Gets Rescue Unit

Recent delivery of the first mobile rescue station to the Maryland Bureau of Mines marks the opening of a

There Is More To Wire Rope Than Meets The Eye—

it's the invisible "ingredients" that make the difference.

Other than its one Red-Strand, a "HERCULES" Wire Rope would look pretty much like any other rope having no distinguishing mark. But there is a difference! And that difference is due to a "thousand and one" *invisible* factors. It is made possible by setting up and rigidly maintaining exacting standards . . . by utilizing our almost 100 years of manufacturing experience in the designing and fabrication of wire rope . . . by strictly following the principle of "quality first!"

As it has never been possible to actually see the numerous properties that make one wire rope outlast another, we originated—in 1886—the idea of painting one strand of "HERCULES" Wire Rope red, and since that time the Red-Strand has not only been a mark by which this rope could be identified, it has been our constant guarantee that its high quality is ever maintained.

Yes, there is more to "HERCULES" Wire Rope than meets the eye, but you can accept, with confidence, the assurance that the Red-Strand provides.

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new phase in its mine-rescue and first-aid-training program, officials point out. Developed by Mine Safety Appliances Co. to accommodate a wide range of equipment specified by the Bureau, the tailor-made all-steel body is mounted on a 1½-ton truck chassis particularly designed to provide maximum power and road clearance. The truck will be located at Kitzmiller, near the Bureau's rescue station. The Bureau maintains two full-time rescue crews of a captain and five men each.

1950 Earning Reports

Earnings recently reported by coal and other companies include:

Island Creek Coal Co.—1950 net profit (preliminary), $5,100,000, equal to $4.16 a common share, compared to $4,141,505, or $3.36 a share, in 1949. Output of 6,164,000 tons in 1950 was nearly 1,280,000 tons above that of 1949.

Pond Creek Pocahontas Co.—Estimated 1950 net income, $2,650,000, or $7.80 a share, compared to $2,183,358, or $6.43 a share, in 1949.

Pennsylvania Coal & Coke Corp.—For 1950, net loss, $110,192, compared with net loss of $42,957 the previous year; gross earnings, $6,029,169, against $6,461,187. For December quarter, net loss, $24,916, compared with net loss of $100,890 in final quarter of 1949; gross earnings, $1,637,033, against $905,209.

Hudson Coal Co.—1950 net income, $600,563 on gross revenues of $41,825,816, compared with net loss of $897,060 on revenues of $36,330,749 in 1949.

Lehigh Coal & Navigation Co.—1950 consolidated net earnings, $2,625,989, or $1.36 a share, against $2,263,208, or $1.17 a share, in 1949. The company completed its 70th consecutive year of unbroken dividend payments in 1950, paying 80c a share. Its coal operating subsidiary, Lehigh Navigation Coal Co., Inc., showed a profit of $70,004 in 1950, against a loss of $475,998 in 1949, in spite of interrupted production as a result of storms in late November and early December.

Joy Mfg. Co.—December quarter, net income of $1,186,150, or $1.34 a share, compared with $450,860, or 51c a share, in the same quarter of 1949. Net sales were $14,375,342, compared with $9,184,234 in the 1949 quarter.

West Virginia Coal & Coke Corp.—1950 consolidated net earnings, $1,638,840, or $3.90 a common share, compared with $830,170, or $1.98 a share in 1949.

Peabody Coal Co.—9 mo to Jan. 31, earnings of $2,027,632 on total sales of $45,421,138, equal to $3.34 per share on the 5% convertible prior preferred and $2.04 per common share. In the same period of 1949, earnings were $183,222 on sales of $29,653,428, or a loss of 66c per common share. Sales were 11,148,931 tons in the 1950 period compared with 6,384,630 tons a year before.

United Electric Coal Cos. and subsidiaries—6 mo to Jan. 31, net profit, $1,162,660, or $1.72 each on 677,920 capital shares, against $157,714, or 23c each on 558,000 shares the previous year.

Truax-Traer Coal Co. and subsidiaries—9 mo to Jan. 31, net profit, $3,345,803, equal to $3.03 a common share, on sales of $44,183,818, compared with earnings of $716,174, or 73c a share, on sales of $18,267,836 in the same period a year ago. Coal output totalled 6,973,682, compared to 3,524,970 a year ago.

Supreme Court Denies Review Of NLRB Union-Shop Order

The United States Supreme Court Feb. 26 refused to review a Court of Appeals decision upholding a National Labor Relations Board order that required the UMWA to stop using a union-shop clause in contracts with 18 captive-mine operators. The clause was the subject of controversy during the 1948 negotiations and both parties finally agreed to abide by the determination of its legality by the courts. By its refusal to intervene, the Supreme Court in effect approved the NLRB order. In another case, the UMWA and two affiliated construc-

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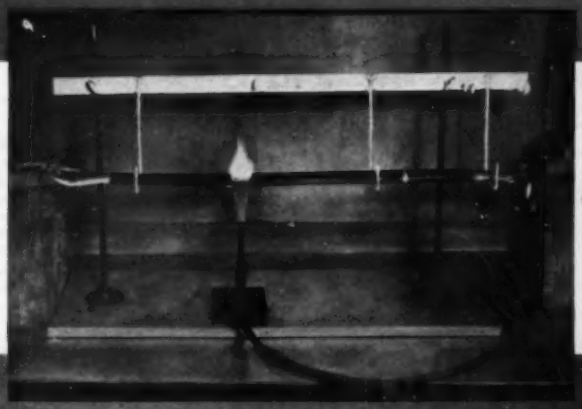
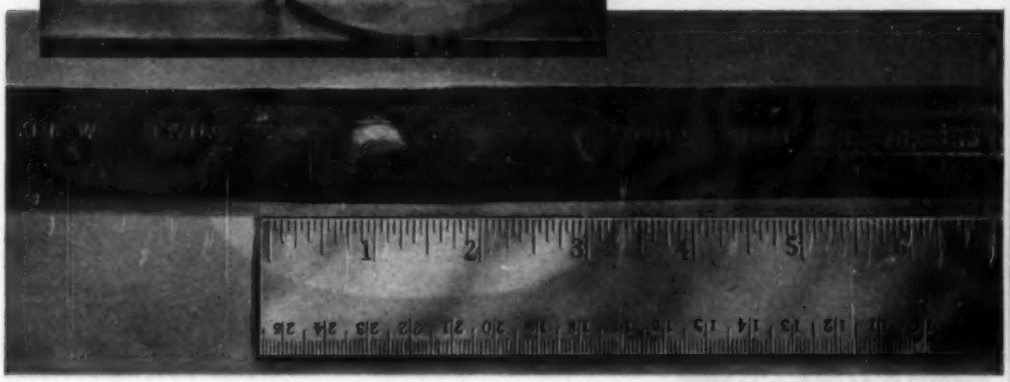
HAZACORD CABLES MORE THAN MEET *NEW FLAME TEST LIMITS*



New flame-resistance test of U. S. Bureau of Mines and Pennsylvania Department of Mines reduces the flame propagation limits from 14" to 6". Burning time is limited to 5 minutes. Complete set-up as required by new test procedure is pictured in Hazard's research laboratory.



Hazacord Twin Parallel Mining Machine Cable after typical flame test under the new, more rigid requirements. Flame propagation measures approximately 3½". There was no burning of the cable after the flame was removed.

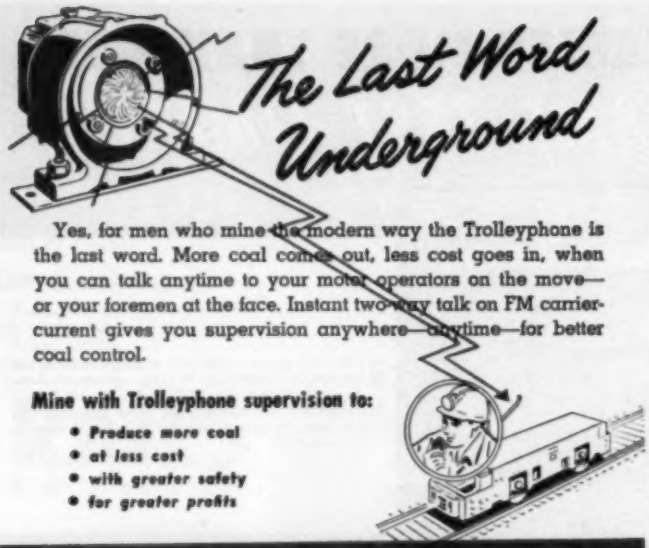
The safety requirements of the new flame test for trailing cables recently announced by the U. S. Bureau of Mines and Pennsylvania Department of Mines are about twice as difficult to meet as formerly.

Hazaprene ZBF sheathed Hazacords amply pass the new test requirements. Exceptional flame-resistance has long been one of the outstanding features of Hazacords. Combined with this quality are many other advantages engineered into Hazacord inside and out to assure you safer, longer, and more economical service with trailing cables and cords.

For example, the Hazaprene ZBF Sheath is also made *tough*—pressure-cured in a continuous metal mold for maximum density, snag-resistant surface smoothness, extra long-life even in the most punishing service. And there is no worry about oils, acids, chemicals, or water reducing the life of Hazacords.

Talk to your Hazard representative about Hazacord trailing cable and cords for your mine or write to us directly. There's a special Hazacord for every need. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD insulated wires and cables for every mining use



The Last Word Underground

Yes, for men who mine the modern way the Trolleyphone is the last word. More coal comes out, less cost goes in, when you can talk anytime to your motor operators on the move—or your foremen at the face. Instant two-way talk on FM carrier-current gives you supervision anywhere—anytime—for better coal control.

Mine with Trolleyphone supervision to:

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- *at less cost*
- *with greater safety*
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Ruberoid Insulating Tape will do more than just "patch" a cable splice. Equally adhesive on both sides, it will strengthen your cable with such vise-like power that you can drag it anywhere with complete safety. Ruberoid's seven big, cost-cutting features assure you of a longer, more economical life for your cables.

1. Double grip . . . both sides adhesive
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3. Won't tear, ravel or pucker
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5. Acid and alkali-proof
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7. Exceeds A.S.T.M. specification by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength.

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tion unions Feb. 17 were ordered by the Virginia Circuit Court to pay $275,000 in damages to the Laburnum Construction Co. of Richmond. The company had sued for $500,000, claiming that a UMWA-led crowd had caused AFL and non-union employees to quit, with the result that a contract between it and the Pond Creek Pocahontas Coal & Development Co. had been cancelled and that negotiations on other contracts had been affected.

And For Your Information . . .

The gas explosion which killed 11 men and injured two others in the No. 1 mine of the Burning Springs Collieries Co., Kermit, W. Va., Jan. 18, probably was set off by an electric arc or spark from poorly made splices in a mining-machine cable, according to the report of the USBM issued Feb. 20. The possibility that the blast was caused by smoking "cannot be discounted," the report said.

The Baltimore & Ohio has reported that with the delivery of current orders by April 1 it will have increased its diesel-powered locomotives of all types from 167 to 596 in the 3 yr from Jan. 1, 1948. With its subsidiary road, the B. & O. will have a total of 631 diesel units. Since the last war, it has spent $3,700,000 in the construction of diesel servicing and maintenance facilities alone.

Construction work started last month on a $180,354 wing to be added to the USBM Anthracite Research Laboratory at Schuylkill Haven, Pa. The addition will provide more space for laboratories, a technical library and a drafting room.

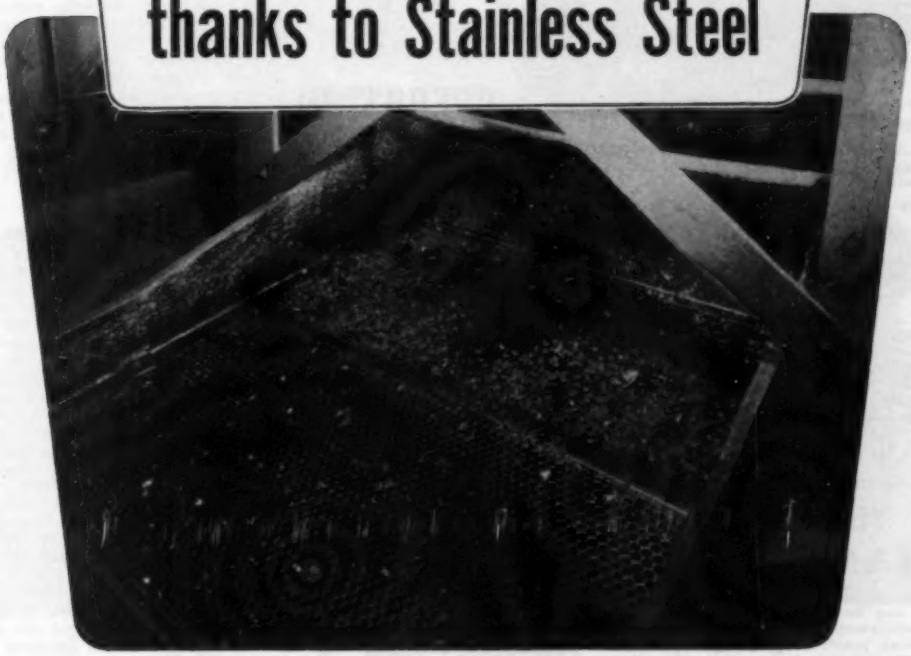
Foreign Developments

British Fuel Crisis Continues

LONDON—The British coal supply continued critical at the beginning of February, with little likelihood that the government-operated mines could produce in the first 3 months of 1951 the extra 3 million tons called for by the government early in January. Output for the first 4 weeks of 1951 totaled 16,834,800 tons, against 16,998,500 tons in the same period in 1949. Despite a sharp increase in imports and drastic curtailment of consumption by industry, railroads, domestic and other users, coal stocks on hand continued to fall, though at a re-

Now you can measure screen life in years instead of months

thanks to Stainless Steel



The U·S·S Stainless screens *on the lower deck of this unit have had an average life of over 3 years.*

More preparation plant operators are discovering every day that perforated screens made from U·S·S Stainless Steel last far longer under the severe service of sizing, dewatering, and desanding than screens made from other materials.

Pennsylvania Coal & Coke Corporation needed only *three sets* of screens made from U·S·S Stainless Steel *in 9½ years* at its Ehrenfeld mine—an average service life of 3 years and 2 months.

And at its Moss Creek mine, Pennsylvania Coal & Coke has had similar results. After three years, U·S·S Stainless Steel screens—16 gage, Type 410—were still in service and in good condition.

U·S·S Stainless Steel screens resist corrosion . . . reduce "blinding" . . . resist wear . . . maintain size . . . slash replacement costs. That's why they classify and desand and dewater more tonnage at lower cost than screens made from other, less efficient materials.

Screens made from U·S·S Stainless Steel are being installed in preparation plants of the industry's largest operators. There are grades of U·S·S Stainless Steel to meet all types of operating conditions. Ask your supplier about U·S·S Stainless Steel screens for your preparation plant.

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7-Ton
Storage battery locomotive

ATLAS STORAGE BATTERY LOCOMOTIVES will do more work on one charge of the battery than any S-B Locomotive of the same weight and battery capacity.

These Atlas Locomotives include every known feature contributing to:—

LOWER OPERATING COSTS—LOWER MAINTENANCE COSTS

Equipped throughout with anti-friction bearings. Also Atlas Double Reduction Spur Gear Drive.

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enables us to manufacture drilling machines that can be relied upon for long periods of continuous high-speed operation, with greatest possible percentage of core recovery. Modern designs, rugged construction, and liberal use of alloy-steel parts minimize time losses and operating expense.

Swivelheads can be either "Screwfeed" or "Hydraulic." Power-unit can be either a gasoline or Diesel engine, an air engine or an electric motor—each driving the swivelhead and hoisting drum through a built-in four-speed sliding-gear transmission. A complete line of improved accessory equipment provides for every drilling and sampling requirement. Catalog mailed promptly on request.

Model 40-C Core Drilling Machine, with Gasoline Engine Power Unit and Oil Operated Hydraulic Swivelhead.

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Besides being manufacturers, we are also one of the largest contractors for any type of Core Drilling—including Grout Holes and Grouting. Experienced crews and supervisors are available at all times for service anywhere in the world. Estimates, and constructive suggestions whenever possible, submitted promptly without charge.

"TRUCAST" BORTZ DIAMOND BITS

have proved their superiority for years in all types of rock formation. Bits may be furnished with various grades of bortz diamonds, set in a matrix of either Beryllium Copper or Beryllium Nickel alloys. Available in a wide range of standard and special sizes ranging from 1½" to 7¾" in diameter.

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duced rate by the end of January. By early February, stocks were estimated at 1,600,000 tons above the danger level of 9,000,000 tons.

If it continues, the coal shortage might even lead to widespread political repercussions and a change in the government, it also was reported. Although the House of Commons Feb. 1 rejected the Conservatives' charges that the Labor government had bungled the country into the coal shortage, the Conservatives were reported to believe that the shortage, together with the rising cost of living, might react to force a new election on the current government. The Conservatives cited professional polls as showing a swing of public opinion against the Labor group.

British Experiment With Underground Gasification

LONDON—Experiments with new methods of obtaining energy from Britain's vast underground coal resources were described recently by Dr. H. Roxbee Cox, chief scientist to the British Ministry of Fuel & Power. Speaking at a luncheon of the Coal Industry Society, he disclosed that two underground fires, each of which was producing energy, were in operation and that by the middle of 1952 there would be an engine burning waste gases, firedamp or methane at a selected pithead.

The gasification experiments, which were begun in July, 1949, follow two basic methods: (1) creating a U-shaped channel with two vertical holes in the coal seam; and (2) connecting two vertical drillings with pneumatic pressure. A project using the first method has been in operation since July, 1950, and one based on the second method has been successfully working for over a month, it was reported.

In an effort to increase the nation's available power, the National Coal Board is giving direct help to the work. Britain has considerable coal which is not considered worth mining because of its dirty condition, narrow seams or great depth. Much of this coal can be utilized by underground gasification, it is believed, and current experiments are being conducted to determine technically and financially practicable methods.

Gas averaging 75 Btu was obtained from coal which consisted of 50% dirt in a wet seam 18 in thick, it was reported during the course of the meeting. In his talk, Dr. Cox described experiments with a gas turbine with preheating apparatus that demonstrated that firedamp or methane could be burned. A 15% mixture of methane in air burned quite easily if heated to 980 deg C, he said.

Coal Deficit Seen for Europe

GENEVA—The United Nations coal trade sub-committee ended a preliminary review of the European fuel situ-

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BETTER OFF-THE-ROAD PERFORMANCE! *Now, for the first time, you have a genuine general utility mining tire that does its job off the road as no tire ever did before it—with entirely new* **PENETRATION** *and* **TRACTION**—*with* **TREAD** *and* **CARCASS JOB-FITTED** *to match the toughest and toughest going.*

BETTER ON-THE-ROAD PERFORMANCE! *Yes, and when you pull, loaded or empty, onto the road or highway, you have a* **SMOOTH-ROLLING ANTI-SKID TIRE** *to match its* **OFF-THE-ROAD EFFICIENCY!**

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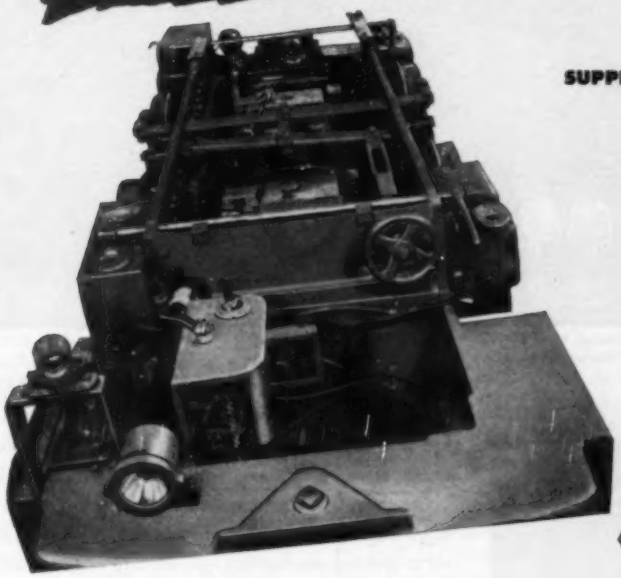

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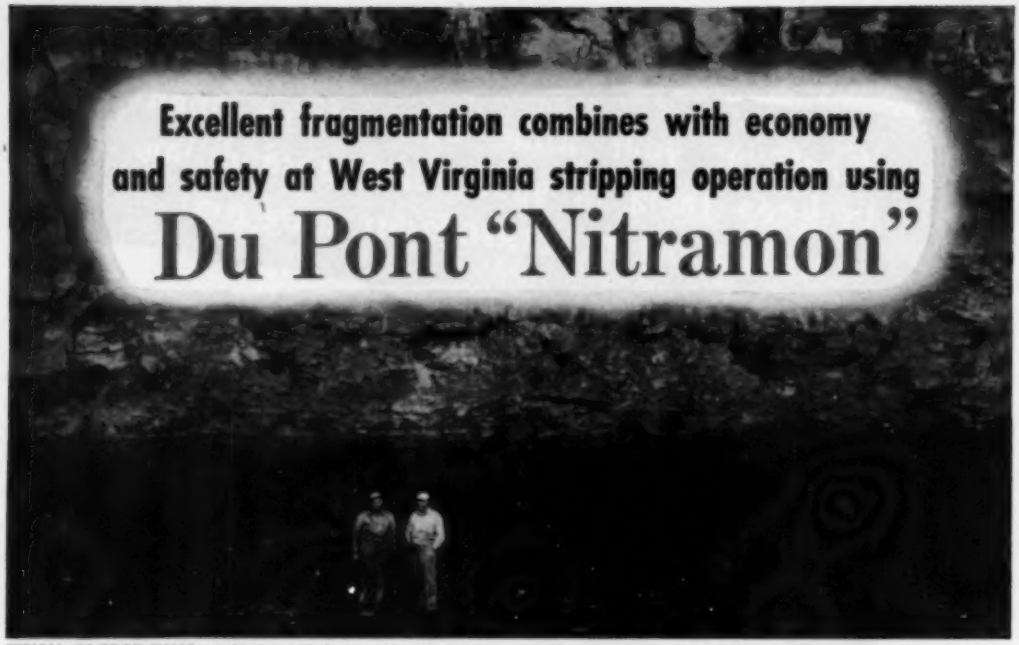
The National Electric Coil Company was born in the coal mining field. Our first plant, in Bluefield, West Virginia, and our new plant in Harlan, Kentucky, are equipped and manned primarily for service to the mining industry. Key people are "graduates" of work in the mines. Either plant can handle any mine locomotive job, from continuous-weld tire tread rebuilding to complete locomotive rebuilding. Overflow coil and motor work from either plant is done in our Columbus, Ohio plant.

Locomotives can be delivered to us via our truck or yours, or by flat car. Motors can be rewound in your shop or ours. And National electrical work is done with a full knowledge of the rugged life of electrical apparatus in mining.

If you don't know the National field engineer near you, drop us a line. He knows your problems; he's there to help you.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.



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"NITRAMON" is packed in easily handled, watertight metal containers and can be loaded immediately after drilling. It cannot be detonated with commercial blasting caps, and is insensitive to open flame, friction or falling objects. A "Nitramon" Primer—itself relatively insensitive—readily detonates the charges. In addition, since "Nitramon" contains no nitroglycerin, it eliminates the risk of headaches.

EXCELLENT RESULTS are shown in this typical after-blast photo. Good breakage facilitates the removal of overburden . . . speeds up the entire stripping operation.

WORK being done by Dippel & Dippel Coal Company for the West Virginia Mining and Consulting Company near Anawalt, W. Va., again illustrates the excellent results consistently obtained with Du Pont "Nitramon". . . the safest blasting agent known. The high degree of fragmentation achieved permits shovels to remove overburden quickly and economically.

"Nitramon" was selected for this coal-stripping operation because of its outstanding blasting efficiency and its superior safety characteristics. Economical, safe and easy to handle, it is the first choice of a large segment of the industry.

Any Du Pont Explosives representative will be glad to give you complete information on the use of "Nitramon" in stripping operations. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

ation Feb. 9 with the conclusion that the coal deficit in April, May and June would be even greater than the winter shortage of 5 million tons of coal and 1 million tons of coke. While there was small prospect that the deficit could be overcome, the committee was working to equalize the deficit among the various countries and was planning to meet later in the month to determine whether German, Polish and other suppliers could help. Shipping shortages made it impossible for more than 1,500,000 tons to reach Europe during the first quarter of this year, it was reported.

IN FRANCE, government estimates reported Feb. 4 indicated 1951 coal demand at 73 million tons, some 14 million tons more than the country's anticipated supply for the year. French production for 1951 is estimated at 54 million tons. About 5 million tons is to be expected from the Saar. Imports from the U. S. and Europe of 10 million tons are sought to meet part of the deficit and it is hoped that the remaining 4 million tons will be gained from increased production and restrictions on consumption.

WEST GERMAN importers are to be permitted to import coal from the U. S., with initial shipments of 200,000 tons planned, it was reported Feb. 9. While currency shortages might normally prohibit such imports, under the proposal export firms in the Ruhr, mainly steel plants, will receive more coal from the Ruhr, in proportion to the tonnage which the Ruhr will "save" by American shipments to Hamburg and Bremen, it was said.

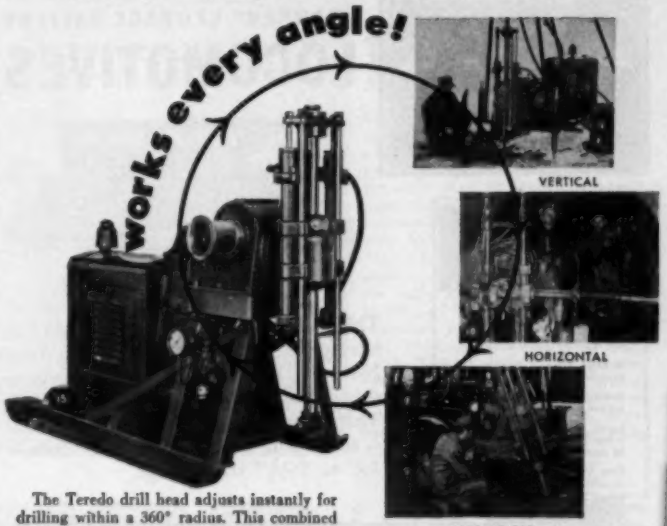
IN ITALY, coal importers have formed a voluntary non-profit association to purchase and import American coal on behalf of its members. The new organization, known as "Usacarbo," has its main offices in Milan and will deal chiefly in gascoal, according to reports. In a revival of coal imports from the U. S., a first order of 400,000 tons was currently being filled at the end of January, it was said.

Australian Miners Strike Again

The Australian government moved early last month to bring leaders of the Communist-influenced miners' union into court in an effort to stop a new one-day-a-week strike of the Commonwealth's 18,000 coal miners. The weekly 1-day strike began Feb. 5 in protest over the one-man coal-industry tribunal's award of Dec. 20, which granted an extra shift's pay to miners who work a full 10 shifts in any 2-week pay period. The union, which had asked for a straight 15% pay increase, amounting to $4.48 a week, called the award an attendance bonus that was a "transparent bribe for workers to abandon their age-long right to industrial action and completely renounce their working-class militancy." Union leaders, who were jailed last summer for defiance of the National Emergency Coal Strike Act,

The NEW Acker Teredo Drill...

works every angle!



The Teredo drill head adjusts instantly for drilling within a 360° radius. This combined with other Acker features such as built-in pumps, cargo-type winches, hydraulic or screw feed heads, choice of power plant, mounting on drag or any type of vehicle, are bound to save time, labor and on-the-job costs.

See for yourself—write for Bulletin 33-CA

Over 30 years' experience in the design and development of Drilling Equipment.

ACKER DRILL CO., INC.
SCRANTON 3, PA.

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PRACTICALLY non-breakable, steel-clad Durakool "fixed time", Timer Relay with mercury to mercury contact operates in "sealed-in" hydrogen under pressure. Tamper-proof delays available from .15 to 20 seconds in either normally open or normally closed actions. Millions of contacts assured.

- ★ No false contacts
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- ★ Quiet in operation
- ★ Eliminates double contacting or breaking of circuit

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Durakool STEEL MERCURY Relays

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DURAKOOL, INC.—ELKHART, INDIANA

A New Locomotive Backed by 25 Years' Experience in the Battery Locomotive field!

GREENSBURG
"RANGER" STORAGE BATTERY
LOCOMOTIVES

All Locomotives CUSTOM-BUILT to your requirements

FEATURES

Oil-tight, leak-proof transmission. Use regular auto oil; change every 6 months.

Strong. Simple. Low maintenance cost.

Extra-long journal springs assure better trackability.

Large motor, to assure more horse power per ton weight of locomotive.

Can be equipped with hydraulic brake.

This locomotive being used for main line haulage at the Blacksmith Coal Company, Novinger, Missouri. This is a 4½ ton locomotive, operating on 30" gauge track. This locomotive built from 3½ to 10 tons — either single or double motor drive — 16" to 56½" track gauge.

MORE HAULING FOR LESS STORAGE BATTERY CAPACITY

THE GREENSBURG MACHINE CO.
Makers of Custom-Built Storage Battery Locomotives
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for "SAFETY FIRST" operation

MINING MACHINE TYPE TROLLEY POLE

Here's the unit that eliminates hazards of tramming in the usual method with a hook or tap held on the trolley. Lightweight, but sturdily built of all-welded steel construction. Flood City's Mining Machine Type Trolley Pole bolts directly on the machine base as shown above . . . special ball-and-socket joint in sub-base releases any shocks or strains caused to the upper part.

Recommended by leading safety and electrical inspectors, this trolley pole assures "SAFETY-FIRST" service, while saving operating time and dollars. Please write for complete information.

FLOOD CITY BRASS & ELECTRIC CO.
JOHNSTOWN, PA.
Branch Office:
4 Virginia St. W., Charleston, W. Va.

agreed to obey the law when they were released in August. The government currently charges them with disregarding that court agreement.

CANADA—Dominion Steel & Coal Corp. and District 26, UMWA, CCL, last month announced a voluntary agreement providing a wage increase of 60 cents a day for the firm's 12,000 miners, effective Feb. 1. The increase was the company's second concession to the cost of living in recent months. Just before Christmas it granted coal-mine employees a $100 cost-of-living bonus.

SOUTH AFRICA—The South African Coal, Oil & Gas Corp., Ltd., (SASOL), plans to locate its proposed oil-from-coal plant at Coalbrook, in the Orange Free State, near Vereeniging. The plant will be near large coal fields, water and labor supplies, and markets and is being planned to produce initially 35 million gallons of motor fuel yearly plus high-grade diesel fuel, and eventually to deliver industrial gases by pipeline. Further expansion under consideration will permit production of 100 million gallons of motor fuel yearly, together with additional by-products.

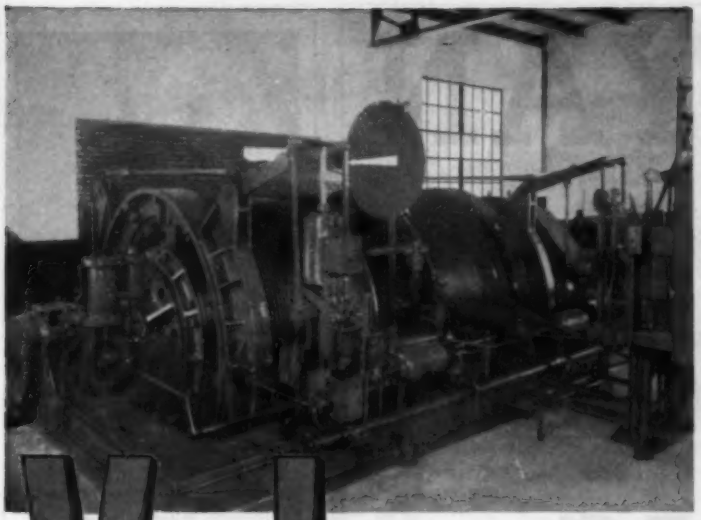
BRAZIL—Creation of a special Coal Department in the Salte plan for Brazilian national development has been proposed by the National Department of Mineral Production in a special report submitted to the president's office. The new department would have a budget of $35 million, with $25 million to be spent between 1951 and 1953. The funds would be available to finance coal mining companies who wish to modernize their equipment and methods and would be repayable in 10 yr at 3% interest. Companies would have to have their modernization plans approved by the government and agree to limit their gross profit to 30%.

Machinery Advisory Group Discusses Mining Problems

Members of the Mining Machinery Advisory Committee recently established by Secretary of the Interior Oscar L. Chapman met in Washington Jan. 24 with officials of the Defense Minerals Administration and the Defense Solid Fuels Administration.

The problem of providing sufficient machinery, equipment and repair parts for maintaining and expanding production of essential minerals, nonmetallic minerals and solid fuels was discussed.

Industry representatives told of increasing difficulties in obtaining steel and copper, and nickel alloys, not only for new machinery but for repair parts for machinery already in service. They also cited increasing difficulty in obtaining electric motors and other component parts of mining



22 Years of Trouble-Free Service And Still Going Strong

Installed at a well-known mining operation in 1928, this 900 hp. double-drum hoist has not only given "Very Satisfactory Service" for more than 22 years but is still, apparently, as good as ever. The cylindrical drums are 9' in diameter by 4'-10" face, grooved for 1⅛" rope. One drum is provided with a positive tooth-type clutch for safe hoisting from different levels, and both drums have parallel-motion post-type brakes. Brake and Clutch engines are air-operated. Vulcan Safety Devices provide dependable protection against any damage that might otherwise be caused by current failure, overspeeding, over-winding or starting in the wrong direction.

Vulcan HOISTS and SHEAVES Are ALWAYS Dependable

For more than a hundred years the Vulcan Iron Works has been building good mine hoists—taking such full advantage of every proved advance in design, materials and accessory equipment that Vulcan Hoists, today, are unsurpassed from every standpoint of Speed, Safety and Operating Convenience. The hoist illustrated and described above embodies only one of the many Vulcan designs that have proved their dependability through long years of trouble-free service and new designs are constantly being developed to meet specific operating conditions.

Correspondence regarding any mine hoisting requirement, no matter how large or how small, is cordially invited. Our experienced engineers welcome opportunities to make money-saving suggestions, whenever possible, without charge or obligation. Ask, also, for Bulletin A-409; its 32 fully-illustrated pages are packed with information regarding all types and sizes of Vulcan Hoists.

Illustration above shows a Vulcan ALLCASTEEL sheave mounted on self-aligning roller-bearing pillow blocks. Another popular type has tapered roller bearings in the hub and revolves around a dead shaft held in steel clamp-type pedestals. Besides being light and very strong, Vulcan ALLCASTEEL sheaves are so highly resistant to rope wear that NO LINERS ARE NEEDED. Available in a wide range of types and sizes with either plain or anti-friction bearings.

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Heavy-Duty Electric Hoists	Shaking-Chute Conveyors	Steam Locomotives	Load-Carrying Larries
Self-Contained Hoists	Chain Conveyors	Diesel Locomotives	Rotary Kilns, Coolers and Dryers
Scraper Hoists	Cast-Steel Sheaves and Gears	geared and electric drive	Briquetting Machines
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Made in 4 sizes:
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All have cast aluminum blades — 60" and 72" sizes have adjustable pitch.

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AIRFLOW INDICATOR SWITCH

• Here's a dependable mercury tube type switch to be used with battery and bell to sound an alarm in the event of ventilating fan failure. Switch is also available for 110 or 220 volt A.C. and may be used with suitable light, bell or horn. . . . The switch is designed for installation in the exhaust air flow of fan. . . . Write for full descriptive bulletin.

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RAIL BONDS

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MESCOWELD Rail Bonds are made in 20 different types—more types of power bonds than are available from any other manufacturer. This means that you can select the MESCOWELD Rail Bond which will exactly meet your requirements.

MESCOWELD Rail Bonds are first in performance because our patented Flashwelding process for attaching terminals to cables assures a more oxygen-free weld and guarantees maximum conductivity and long life.

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Three Popular Types

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Type M8-F

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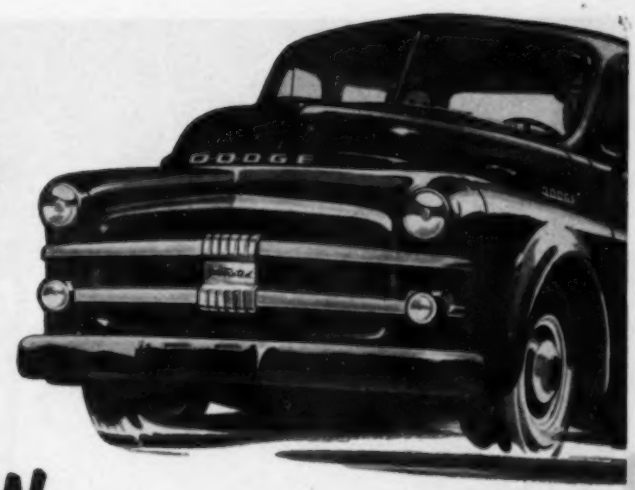
equipment which are made by subcontractors and suppliers. The desirability of setting up a specific allocation of various metals for mining machinery and equipment, as has been done for freight cars and ore boats, was suggested, and the problems presented by the drafting into the armed services of highly skilled workmen were discussed.

DMA and DSFA representatives pointed out that a program of the requirements for the maintenance, repairs and operating supplies of the mines, and for the manufacture of mining machinery and repair parts has been presented to the Defense Production Administration for appropriate action. This program, it was said, may provide some means of relief for the mineral industries until some over-all system of material allocations is established. At the present time the industry is being assisted in meeting its most critical problems on a case-by-case basis, especially where shortage or lack of equipment and machinery threatens to force the closing of mines or plants producing essential and strategic mineral products. The government already has taken preventive action in several such instances.

Defense Minerals Administrator James Boyd and Defense Solid Fuels Administrator Charles W. Connor, co-chairmen of the meeting, stated that to facilitate the solution of the prob-

"Job-Rated" for COAL MINING



Brand new DODGE "Job-Rated" TRUCKS

The trucks that do the most for you!

More than 50 BRAND-NEW improvements . . . including

NEW! SMOOTHER RIDE with new, "Oriflow" shock absorbers—standard equipment on ½-, ¾-, and 1-ton models.

NEW! EASIER LOADING with lower ground-to-floor height—on all models through 2 tons.

NEW! EASIER BAD-WEATHER STARTING with new moistureproof ignition and high-torque starting motor.

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NEW! SMOOTHER ENGINE IDLING with "hotter" spark plugs; on all models through 1 ton.

BRAND-NEW POWER—You get more power than ever—engineered for *your* job! Eight great engines—with net horsepower stepped up as much as 20%! You get more of the *right* power for your needs—with top economy! Yet, with all their extra value, new Dodge *"Job-Rated"* trucks are priced with the lowest.

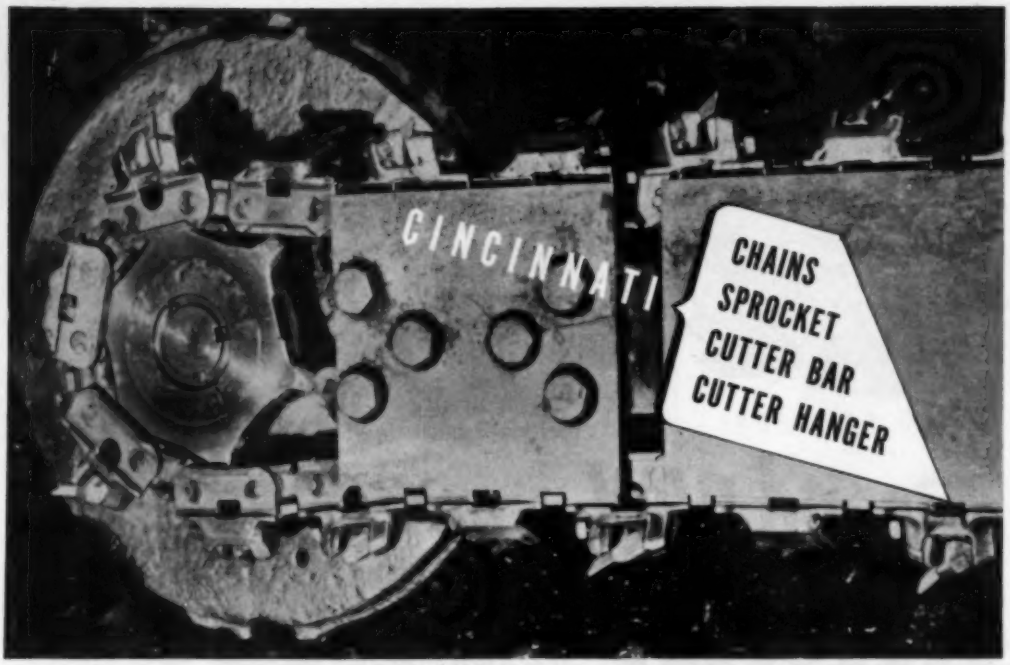
BRAND-NEW EASE-OF-HANDLING—You can turn new Dodge *"Job-Rated"* trucks sharper . . . maneuver them more easily. New shorter turning diameters! New worm-and-roller steering gears! All this—plus cross-steering, wide front tread and short wheelbase.

BRAND-NEW BRAKING SAFETY—New Dodge *"Job-Rated"* trucks are the trucks with new molded, tapered Cyclebond brake linings! New *extra-quiet* action! New extra-smooth, extra-sure stopping! New longer lining life! (On new 1½-ton and up trucks, except air brake models.)

PLUS THIS EXCLUSIVE! Gyrol Fluid Drive available on ½-, ¾-, and 1-ton, and Route-Van trucks.

See your Dodge Dealer today for

THE TRUCK THAT FITS YOUR JOB... A DODGE "Job-Rated" TRUCK



Close-up view showing Cincinnati Cutting Equipment (Duplex Chain, Bit, Bar and Sprocket) mounted on Sullivan 7-AU machine ready to shear. The operation where this photograph was taken has many Sullivan 7-AU machines in use and has standardized on this type of Cincinnati Equipment.

CINCINNATI COAL CUTTING EQUIPMENT MEANS LOWER CUTTING COSTS!

DEEP down in thousands of American coal mines and in many foreign mines, Cincinnati Coal Cutting Equipment is performing with maximum efficiency and a minimum of servicing. If you are not now using Cincinnati Chains, Bits, Bars and Sprockets we suggest you talk to one of the Cincinnati Mine Representatives in your territory or write us direct. They will welcome the opportunity to prove to you that Cincinnati Chains, Bits, and Bars will use less power . . . provide more tonnage at less cost and at the same time decrease maintenance costs. Cincinnati Chains are built to meet all cutting conditions . . . your problem is ours. Let us hear from you . . . there's no obligation.

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"The Class O-CE Chicago Pneumatic Horizontal Duplex Motor-Driven Compressor is the first to have anti-friction roller bearings throughout. This big advancement in compressor design utilizes SKF Spherical Roller Main and Crankpin Bearings . . . this innovation in side-crank compressor design is made possible by SKF's recent development of the Oil Injection Method of bearing installation and removal.

"With anti-friction bearings many advantages are evident. Reduced maintenance time and costs, one-piece connecting rods and crank discs, a flood lubrication system and no possibility of improper bearing adjustments are among these."*

Once again SKF, by helping put the right bearing in the right place, has contributed to the engineering of more efficient equipment designed to give more dependable and economical service.

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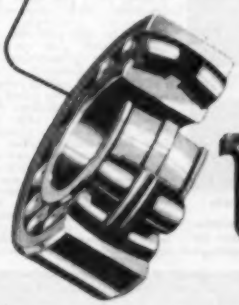

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—manufacturers of SKF and HESS-BRIGHT bearings.

You would'nt SHIP COAL

in a TANK CAR!

why SHIP WATER

in a COAL CAR?

a C·M·I Centrifugal DRYER

—will turn your slurry and "wet coal" liabilities into assets and . . . profits.

CENTRIFUGAL & MECHANICAL INDUSTRIES, INC.
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lems of mining machinery manufacturers—some 160 firms in the United States—a five-man Joint Committee on Mining Machinery and Equipment has been established to coordinate the interests of the DMA and the DSFA in the presentation of claims for materials needed by the mining-machinery industry.

From those industry representatives who attended the meeting, a permanent advisory committee consisting of the following 10 men was selected to advise on specific problems and to present the industry's views on proposed government actions: J. H. Fulford, Jeffrey Mfg. Co.; W. E. Goodman, Goodman Mfg. Co.; J. D. A. Morrow, Joy Mfg. Co.; H. V. Brown, Brown-Fayro Co.; R. D. Longyear, E. J. Longyear Co.; Oscar H. Johnson, Mine & Smelter Supply Co.; Harry N. How, Western Machinery Co.; M. L. McCormack, Ingersoll-Rand Co.; John F. Courtright, Marion Power Shovel Co.; and J. T. Ryan, Jr., Mine Safety Appliances Co.

New Books for Coal Men

How to Choose a Fuel

Fuels and Combustion Handbook, edited by A. J. Johnson and G. H. Auth. Here's help in selecting a fuel or combination of fuels to get best results and lowest cost. You'll find out what factors to weigh in deciding on fuels—location of plant, characteristics of the various fuels available, and demands of pocessing and manufacturing methods. Aim of this book is to collect from widely scattered sources, such as pamphlets, articles and engineering reports, the most up-to-date information on fuels and their use. There are sections on solid fuels, liquid and gaseous fuels, combustion, fuel selection, coal preparation, fuels-handling, and generation and transfer of heat. *915 pp. 6¼ x 9¼-in; cloth. McGraw-Hill Book Co., 330 West 42nd St., New York 18. $12.50*

How to Clean Minerals

Elements of Ore Dressing, by A. F. Taggart. Though this book is mostly about metallic and non-metallic minerals, it tells a coal man a good deal about principles and practical experience in cleaning minerals, much of which is applicable to coal. There are chapters on mechanical picking, settling, gravity separation, sink-and-float, jigging, crushing, concentrators, transport, controls and flowsheets. *595 pp. 6¼ x 9¼-in; cloth. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $10.00*

New Facts About Coal Cleaning

Coal Preparation, edited by D. R. Mitchell. This brand-new edition (1950) of the standard text on coal preparation revises and brings up to date the older edition (1943). Several

"W" DENTED SHAKER SCREENS

A "must" when it comes to obtaining an efficient job! *Good* because the spreading and collecting riffles give uniform spread of material over the entire screen surface . . turns the top and middle flow of material down in direct contact with the screen . . . gives an increased screening efficiency up to 33% on fine sizes over an undented flat screen.

Comes in Carbon and Stainless Steels and Manganese Bronze. No sag.

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For Superlative Service from All Flat Belting

For superlative service from ALL flat belting, Crescent, the original Plate and Rivet Belt Fasteners, have unequalled ruggedness. Maintain full STRENGTH of belt for full LIFE of belt. Just cut belt ends square, attach Crescent Plates, with Crescent Rivets. For all kinds of belting rubber, leather, balata, etc. Joints are strong, smooth, noiseless, durable, economical, safe. No metal touches pulleys. Crescent Belt Fasteners are used on conveyor, transmission and elevator belting. Thousands in use on these belts in all types of industries, standing terrific strains, handling coal, ore, etc. For complete details, service charts of sizes, etc., write or phone nearest office, today.

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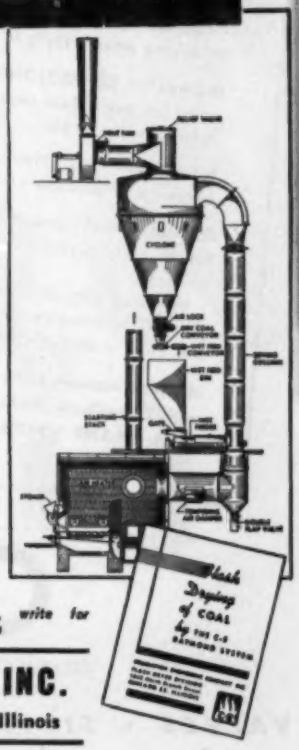
IF Your Plant is **LARGE**

or **SMALL**

You Can Use . . .

C-E RAYMOND

Flash Drying System



Are you producing fine coal sizes between ⅜" x 0"?

Then you can take advantage of the economies offered by the C-E Raymond Flash Drying System, because this equipment may be designed for any capacity requirements from around 7 tons per hour up to 175 tons or more of dried coal.

It will handle initial surface moisture up to 12% without recirculation. By using recirculation, there is no upper limit to the initial moisture which can be handled, and 25% to 30% is common practice. The final moisture content is readily varied to suit conditions. This will range from 0% to 3% in most installations.

Various size plants all over the U. S. are using C-E Raymond Flash Drying Systems with great success, and many are putting in repeat installations for plant expansion programs.

For further details, write for Flash Drying Bulletin

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FLASH DRYER DIVISION **1315 North Branch St., Chicago 22, Illinois**

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make it yours
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No. 960 Crane Brass Pressure Regulator for steam or air. Literature on request through your Crane Branch or Crane Wholesaler.

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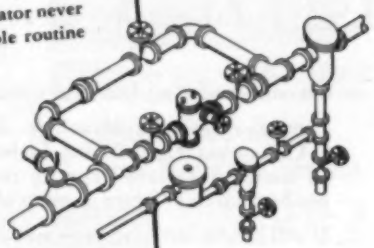
PROBLEM: To choose a pressure regulator that would assure a steady, unvarying steam supply to cooking kettle for an exacting brewing process.

WORKING CONDITIONS: Regulator subject to continuous operation 24 hours per day. Main steam supply at 100 psi to be constantly reduced and maintained at 30 psi.

SOLUTION: Crane No. 960 Brass Pressure Regulator. (*Former model with integral non-renewable cylinder.*)

RESULT: For 16 years, throughout its lifetime, the Crane 960 Regulator never failed, never faltered, never required more than prescribed simple routine servicing.

Replaced with new Model 960 Crane Pressure Regulator. With all wearing parts renewable, it will virtually never wear out. Now in service 18 months; operating cost: zero.



A typical example of the long life and low-cost maintenance that make Crane Quality the best value in all types of valves. That's why...
More CRANE VALVES are used than any other make

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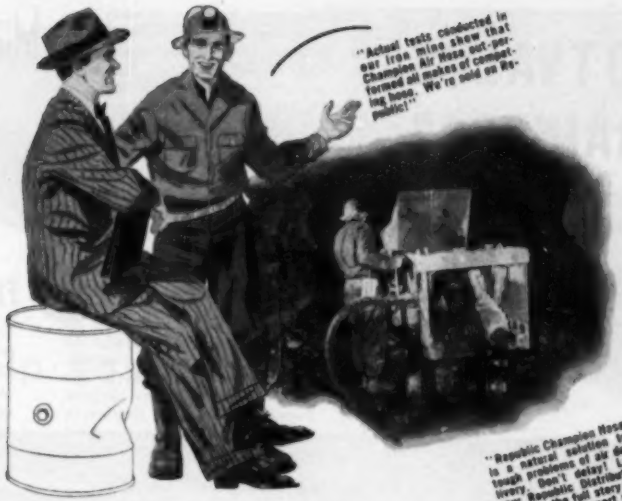
"Actual tests conducted in our iron mine show that Champion Air Hose out-performed all makes of competing hose. We're sold on Republic!"

An oil-resistant Neoprene tube, a rubber-insulated, premium high-tensile braided carcass and a resilient yellow safety cover make Champion Air Hose the toughest product of its class anywhere in the world.

"Republic Champion Hose is a natural solution to tough problems of air delivery. Don't delay! Let your Republic Distributor give you the full story today. His free, expert recommendations save you money."

Try Republic First...

CHAMPION CALIBRE AIR HOSE

Equip with Republic's Champion All-Service Air Hose and you're set for a good long period of trouble-free operation. *And that goes for any job no matter how tough!*

Republic's Champion Air Hose is colored yellow for safer visibility. It's specially fabricated for added strength and flexibility without any increase in over-all hose weight. Champion Hose is another great achievement produced by Republic, *specialists in industrial rubber products for a half century.* Contact your local Republic Distributor or write direct for full facts.

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YOUNGSTOWN, OHIO

"Most compressors spit oil and heat into air lines. Provide a short detachable lead or periodically turn hose end for end (A to B; B to A) and you'll deter concentrated buildups of these destructive agents and greatly increase hose life."

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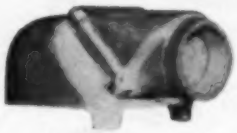
BUY'EM FROM GUYAN



An improved accessory for pumping equipment—provides straining surface approximately double the area of pipe for which the unit is tapped. Has built-in check valve.

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WEDGE-WIRE PREPARATION SCREENS

THE *Right* KIND • TYPE • SIZE

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Developing Engineers

Eighteenth Annual (1950) Report, Engineers' Council for Professional Development. What the council is doing to improve methods by which a man becomes an engineer, increase the usefulness of his engineering studies and clarify the ways by which he becomes recognized professionally. As a supplement, there is a list of accredited Undergarduate Engineering Curricula in the United States. *Report, 50c; Supplement, 25c., Engineers' Council for Professional Development, 29 West 39th St., New York 18.*

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Other Books and Booklets

Coal Resources Map of Wyoming, by H. L. Berryhill, Jr., D. M. Brown, R. N. Burns and J. X. Combo. Scale: 1 in = 8 mi; black and six colors; single sheet, 41x54 in. Coal Investigations Map C 6. $1; Distribution Section, Geological Survey, Denver, Colo., and General Services Building, Room 1210, Washington 25, D. C.

Estimate of Known Recoverable Reserves of Coking Coal in Indiana County, Pa., by J. W. Dowd, L. A. Turnbull, A. L. Toenges, H. M. Cooper, R. F. Abernethy, D. A. Reynolds and W. L. Crentz. USBM, R.I. 4757. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Fundamentals of Smoke Abatement, by J. F. Barkley. USBM, I.C. 7588. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Statistical Data on the Mechanical Cleaning of Bituminous Coal in the United States, by R. L. Anderson. USBM, I.C. 7591. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Coal Resources of New Mexico, by C. B. Read, R. T. Duffner, G. H. Wood, and A. D. Zapp. U.S.G.S. Circular 89. Free, U. S. Geological Survey, Washington 25, D. C.

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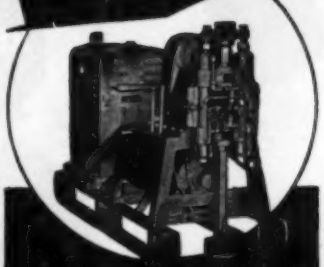

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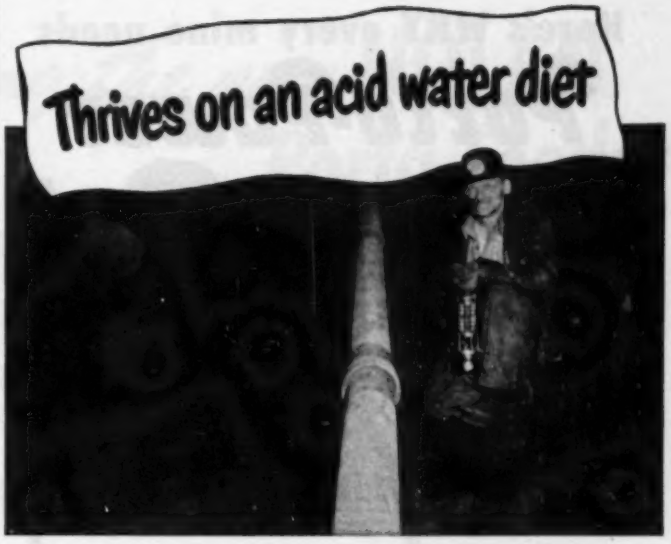

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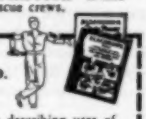

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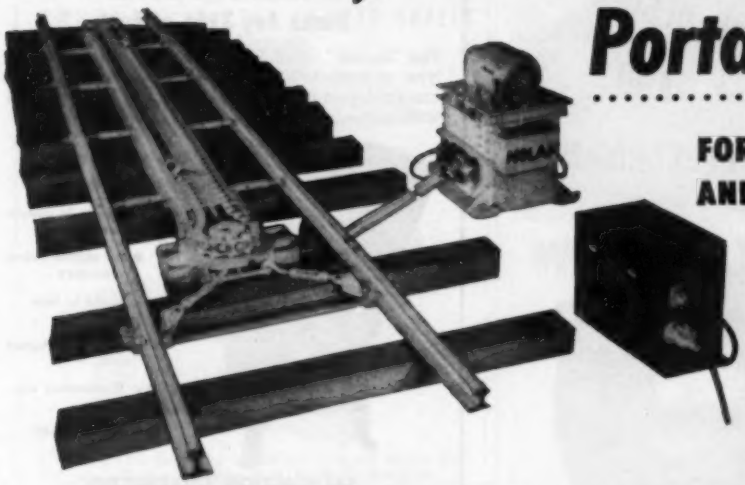

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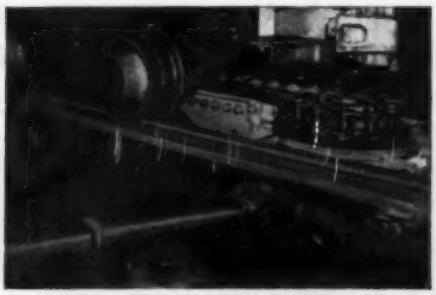

Porta-Feeder Installation in a PITTSBURGH COAL CO. Mine

Close-up view of the heavy propeller shaft and universal joint assembly used to drive the new Nolan Porta-Feeder. Note the strong, massive construction of the feeding mechanism, and its position on top of the track ties.

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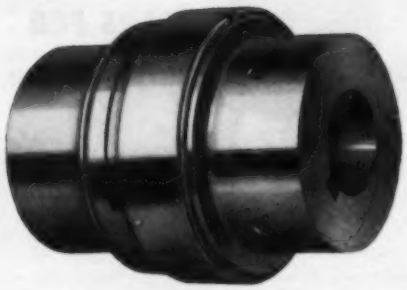

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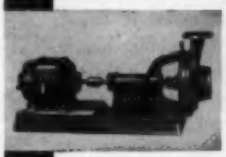

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1—500 KW G.E. 275 V. MPC Generator 900 RPM
1—300 KW G.E. 575 V. HCC Converter 1200 RPM
1—150 KW G.E. 275 V. MPC Generator 1200 RPM

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2—30 T JEFFREY 250 V. MH-77 48-36" Ga.
1—25 T G.E. 500/250 V. HM-824-A 44-36" Ga.
1—20 T JEFFREY 250 V. MH-77 48-36" Ga.
2—13 T JEFFREY 250 V. MH-2110 42-32" Ga.
1—12 T GOODMAN 250 V. 136-B 36" Ga.
1—10 T JEFFREY 250 V. MH-2110 48-36" Ga.
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2—10 T GOODMAN 250 V. 36-B 36" Ga.
2—8 T JEFFREY 250 V. MH-100 42-36" Ga.
1—8 T WEST. 250 V. ML-906-C 44-36" Ga.
2—6 T JEFFREY 250 V. MH-88 44-36" Ga.
2—4 T JEFFREY 250 V. MH-121 44-36" Ga.

LOCOMOTIVE MOTORS

2—JEFFREY 250 V. MH-77, Ball Bearing
2—WEST. 250 V. ML-908-C, Ball Bearing
2—WEST. 250 V. ML-906-C, Ball Bearing
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4—WEST. 250 V. ML-901-C, Ball Bearing
2—G.E. 500/250 V. HM-824-A, Ball Bearing
2—G.E. 85/125 V. HM-828-A, Ball Bearing

LOCOMOTIVE ARMATURES

MH-78-500 V. 908-C-500 V. 158-C-250 V.
MH-77-250-V. HM-824-A-250 V.
MH-110-250 V. 906-C-250 V. HM-824-A-500 V.
MH-100-250 V. 903-C-250 V. HM-809-250 V.
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(2) D8 Caterpillar Tractors
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(1) 160 Ft. Air Compressor
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Location: Zanesville, Ohio
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25 ton American Gas Locomotive Crane
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1947 & 1948 MODELS, excellent condition:

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(1)—11BU LOADER
(5)—11B CUTTERS
(2)—32E SHUTTLE CARS, cable reels
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(6)—T1 CAT MINING TRUCKS
(6)—PL ELEV. CONVEYORS
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1—3-Drum I.R. Slusher, with built-in 50 HP AC Motor.
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1—24 x 24 Jeffrey Single Roll, with or without motor.
1—36" American Ring Type Crusher.

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2—Ironton Locos. 6000# Chassis, 36" Ga., complete with Exide Batteries and chargers.

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1—D-4400 Caterpillar V-belted to a 30 KVA 220 volt Fairbanks-Morse AC Generator, complete with switchboard.

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150—Card RB Pit Cars, 36" ga., 1.7 ton cap.
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1150'—3" Std. Blk. Pipe.
20# - 30# - 40# Switches, complete.
2—7½ Goodman Trolley Locos., 36" ga.
1—20" Belt Conveyor, 40' long.
Electric Gongs.
1—Acetylene Sight Feed Generator.
2—Iron Fireman Stokers.
2—AC Coal Drills.
1—Bucket Elev. on steel frame—30' ctrs.
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1—2ton Y & T Chain Blocks.
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800 KW Westgh. 275 V. 1200 Rev. Rotary with 2300 V. Trans.
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50—All Bronze Cent. Pumps from 200 GPM to 1400 GPM each with 220 V. Westgh. SK motor.
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2—8 Ft. Jeff. Aerodyne Fans with 30 HP AC motors.
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3 Goodman 612¼ Conveyors with pans.
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1—14 BU Joy, Completely Rebuilt.
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1—9 BU Joy, AC. Almost new.

BELT CONVEYORS

1—133' Barber Green, 30" Tipple Belt. New.

SUB STATIONS

1—300 KW Westinghouse MG Set, 275 V. DC, 1200 RPM 2/60/2300/4000 V. AC.
1—150 KW Westinghouse Rotary Converter, 275 V. DC with Transformers.
1—150 KW G. E. MG Set, 500 V. DC, 1200 RPM, 2/60/2300/4000 V.

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1—8 ton Jeffrey with MH 102 motors.
1—8 ton Jeffrey with MH 100 motors.
1—6 ton G.E. HM 830 motors.

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3—35 BB Jeffrey, 220 V.
2—35 B Jeffrey Shortwall, 250 or 500 V.
1—35 BB Jeffrey, 220/440 V. A.C.

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Pittsburgh 6, Penna.

2—Goodman Style G20B77 permissible Shaker Conveyors, latest type, with manual type HAD duckbill and 20 HP Westinghouse AC motor, 3 phase, 60 cycle, 220 volt, 1160 RPM.

The above equipment is to include all usual accessories and is guaranteed to be in A-1 condition. New in 1943. It is offered subject to prior sale, f.o.b. Sunnyside, Utah.

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1½ to 10 Tons 18" to 54" Track Gauge.
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MOTORS — M. G. SETS — TRANSFORMERS

SQUIRREL CAGE MOTORS
3-Ph., 60-Cy.

Qu.	H.P.	Make	Type	Volts	RPM
1	600	G.E.	IR	2300	514
1	600	G.E.	KT-412	2300	450
1	300	Al. Ch.	AR	440	1760
1	250	Wbse.	CS	2300	1140
1	200	Al. Ch.	AR	220/440	880
2	125	Al. Ch.	AR	2200	1750
1	125	Wbse.	CS-761	440	1750
1	125	G.E.	KT-560	2200	875
2	125	C.W.	1260	440	430
2	100	Wbse.	CS-663	440	1750
1	100	Al. Ch.	AR-226	2200	1160
5	100	F.M.	HS-201C	440	880
1	100	Al. Ch.	AR	550	690
1	100	F.M.	H-261B	440	450
1	100	Wbse.	CS-938	2300	514
1	100	Al. Ch.	AR	440	495

SYNCHRONOUS MOTORS
3-Phase, 60-Cycle

Qu.	HP.	Make	P.F.	Volts	R.P.M.
1	1500	Wbse.	.8	2200	720
1	700	C.R.	.8	2300	720
1	450	G.E.	.8	440	360
1	400	Wbse.	.8	440	600
1	268	Al. Ch.	1.	2200	900
2	250	Al. Ch.	.6	2200	514
1	200	Wbse.	.6	440	360
1	150	G.E.	1.	2200	900
1	150	G.E.	.8	550	450
1	150	G.E.	.8	2260	600
3	125	Al. Ch.	1.	4800/2400	900
1	125	Al. Ch.	.8	2200	900
3	100	Wbse.	.9	440	1800
1	100	Wbse.	1.	2200	1200
1	100	Ideal	.8	440	900
2	100	G.E.	.8	440	600
1	60	G.E.	.8	440	1200
2	50	G.E.	.8	2200	600

With the above we can supply manual, semi-magnetic or full magnetic, reduced to full voltage control.

SLIP RING MOTORS—CONSTANT DUTY—3-Ph., 60-Cy.

Qu.	HP	Make	Type	Volts	RPM
2**	1000	Al. Ch.	ANY	2200	225
1	1000	Wbse.	CW	2200	864
1**	600	G.E.	MT-412	2300	719
2	500	G.E.	I-16-M	2300	630
1***	400	G.E.	MT-574	550	585
1**	400	G.E.	I-M	2300	590
1**	400	Al. Ch.	ANY	2200	585
2	400	G.E.	MT-412	2300	600
1	300	G.E.	I-F15-M	2300	1200
1	250	Al. Ch.	ARY	2200	585
1	250	Al. Ch.	ARY	440	440
1	250	Wbse.	CW-1106	2200	580
1	250	Wbse.	C.W.	550	514
2	250	G.E.	MT-414	2300	300
1	200	G.E.	I-M.	2300	600
1	150	G.E.	I-H15-M	2300	1750
1***	125	Wbse.	C.W.-870	2200	900
1	100	Al. Ch.	ARY	440	1160
1	100	F.M.	420-C	440	900
1	75	G.E.	I.M.	440	695
1	50	G.E.	MT-536	2200	1150

** — Mill type pedestal bearing. *** — 3-bearing.

TRANSFORMERS (Oil Cooled)

Qu.	K.V.A.	Make	Type	Phase	Voltage
2	4500	G.E.	HT	3	27000/13200/2300
1	4000	G.E.	H	3	22860/2300/4800Y
1	3750	Wbse.	S	3	67000/14300/2600
2	500	G.E.	WT	3	14400/13200/480
3	500	G.E.	H	1	13220/11000/220/660
3	300	Pitts	OSSC	1	14400/12600/220/440
10	100	G.E.	HT	1	14400/12870/260/480
2	100	Wbse.	AUTO	1	2600/4160Y/1385/2400Y
2	100	Wbse.	SS	1	12075/10955/230/460
2	75	G.E.	KF	1	2400/4160Y/120/240

MOTOR GENERATOR SETS

Qu.	KW	Make	R.P.M.	Volts DC	Volts AC
1	750	Wbse.	900	600	2300
1	700 (3U)	G.E.	720	250	2300
1	600	G.E.	720	300	2300
1	500	Al.	720	525	2300
1	500	C.W	720	250	2300/600
1	500 (3U)	Wbse.	1200	120/24	4000/2300
1	300	Wbse.	900	250	2300
1	200	Ridgeway	900	275	2300
1	155	G.E.	720	250	2300/440
1	150	Al. Ch.	1200	250	2300/440
1	100	Ridgeway	1200	275	4000/2300
1	85	C.W.	1200	250	2300/440
1	75	Wbse.	900	75	2300
1	75	Al. Ch.	900	250	2300
1	75	Star	1200	250	440/230
2	25	Wbse.	1200	120/240	440/230

2U—2 unit set.

DIRECT CURRENT MOTORS

Qu.	HP	Make	Type	RPM
4 xxx	800	Wbse.	Excl. (Rev)	680
1	600	Al. Ch.	Mill	600/1200
1	350	G.E.	C D 169	1150
1	325	Wbse.	O M	650/900
1	300/250	El. Dy.	822	600/1200
1	300	Wbse.	Mill (Rev)	300/1200
1	180	G. E.	M P C	660
1	150	Al. Ch.	Mill (Rev)	600/1200
2 x	150	Cr. Wh.	RJ H	800
1 xxx	125	Wbse.	SIC-190	600
1	100/125	Rel	1995 P	300/1200
3	100	Rel	1050 T	600/1200
1	90/100	G.E.	MPL	625/1125
1 x	80/75	Rel	1995 P	300/1200
1 x	30/75	Wbse.	SK 151 L	600/1200
1	50	Wbse.	BFC	300/1200
1	40	Al. Ch.	E 127	850/1750
1	35	G.E.	CD 125	600/1200
1	35	G.E.	CD 167	300/1200
2	35	G.E.	RF 14	500/1500
1	35	Rel	T	250/1000
1	32½	Wbse.	SK 150	600/1200
1	30	Al. Ch.	E 165	600/1200
1	30	G.E.	CDM 105	875/1750
2	27½	El. Dy.	15 S	650/1150
1	25	G.E.	RF 13	600/1600
2	25	G.E.	CD 123	600/1200
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1	25	Wbse.	SK 111 L	350/1000

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H.P.	MAKE	SPEED	TYPE	WDG.
50	West.	1750		S.C.
50	G.E.	865	I	S.C.
50	G.E.	490	I	S.C.
75	West.	580	CS	S.C.
75	West.	700	CW	S.R.
75	G.E.	865	ITC	S.R.
75	G.E.	865	ITC	S.R.
75	G.E.	865	ITC	S.R.
75	G.E.	865	ITC	S.R.
75	G.E.	865	ITC	S.R.
75	G.E.	865	ITC	S.R.
80	G.E.	860	MTC	S.C.
100	U.S.	1750	Dripproof Ball Brg.	S.C.
100	West.	1160	CS	S.C.
100	G.E.	1790	KF	S.C.
100	G.E.	865	I	S.C.
100	West.	3540	CS	S.C.
104	G.E.	900	I	S.C.
112	G.E.	495	ITC	S.R.
112	G.E.	495	ITC	S.R.
150	F.M.	1760	QZK	S.C.
150	West.	700	CS	S.C.
150	West.	1750	CS	S.C.
150	G.E.	600		S.C.
150	G.E.	720		S.C.
200	G.E.	875		S.R.
200	West.	900		Sym.
200	G.E.	875	I	S.R.

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14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	32 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
28"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
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42"	5	1/8"	1/16"	32 Oz.
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160	G.E.	600	IK	S.C.
150	West.	514	CS	S.C.
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100	Al-Ch.	720	ARX	S.C.
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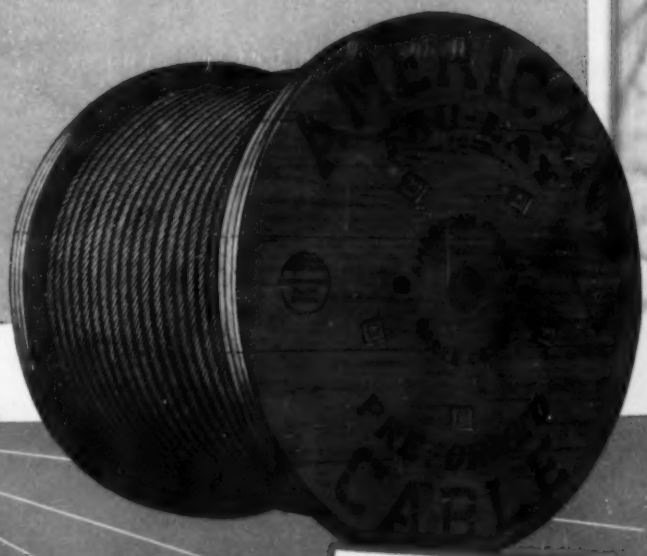

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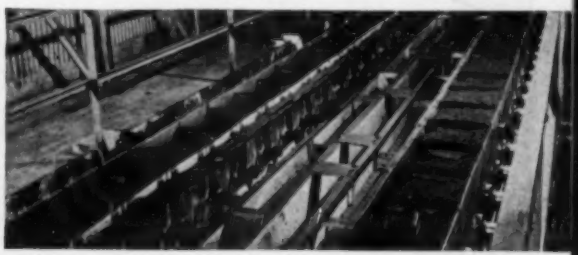
New Link-Belt preparation plant keeps step with mechanized loading . . . delivers cleaner coal at lower cost.

Link-Belt Rotary Car Dumper unloads two mine cars at a time in train without uncoupling—completes a full cycle (cars returned to upright position) every 60 seconds. Unloading "foreign" coal from other mines is speeded with a Link-Belt Car Shaker at Inland.

Push-button control coordinates all operations. In background is one of two Link-Belt Air-Pulsated Washers that give sharp, automatic separation of all ash-forming impurities. Compressed air allows graduated pulsations in cells for different weight refuse.

Coal moves on Link-Belt Belt Conveyor *(foreground)* from car dumper hopper to screen house. Mine rock is carried away on by-pass conveyor *(background)*. Both, together with all other belt conveyors at Inland, roll efficiently on Link-Belt Series 100 Idlers.



Minus ⅜ in. coal is automatically distributed for washing by a Link-Belt Sidekar-Kartrier at a constant rate to 18 concentrating tables. To maintain flexibility, any number of tables can be shut down without interfering with controlled supply to remainder.

200 extra tons of pig iron daily

. . . with less coal!

LINK-BELT handling, preparation know-how produces cleaner metallurgical coal at less cost per ton for Inland Steel.

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Equally important, the new plant permits "total seam" mining. Extracting coal in fault areas, formerly uneconomical, steps up ton-per-man production . . . permits recovery of a larger per cent of the deposit.

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